



THE HISTORY OF THE FRENCH MILITARY MEDICAL CORPS

Daniel P. Rignault



to Professor De Rooley
in return for what he
did for all of us in
the field of military
surgery. David Ruffant

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INTRODUCTION

The main source for historical information in this chapter is *Histoire de la Médecine aux armées*, edited under the supervision of the Comité d'Histoire du Service de Santé (Committee for the History of the French Military Medical Corps) (Ref. 1–3). This three-volume history of military medicine in France was published in Paris between 1982 and 1987 and is available only in French. In 1,321 pages the committee summarized the development of the French military medical corps from antiquity to the present and described the landmarks in the development of military medicine in France. The various contributors to this enormous endeavor were specialized historians as well as military or civilian physicians with a special interest or experience in this history.

A second source, *Tribulation du Service de Santé Militaire Français des origines à nos jours*, was written in French by Inspector General C. Sieur and published in 1928 in the *Bulletin de la Société Française de l'histoire de la médecine*. Fortunately for readers not fluent in French, General Sieur's paper was translated into English by Lieutenant Colonel Fielding H. Garrison, Medical Corps, US Army, entitled *Tribulations of the Medical Corps of the French Army from its Origin to our Own Time*, and published in The Military Surgeon in its June, July, and August, 1929, issues (4–6).

General Celestin Sieur (1860–1955) was professor of military surgery at Val-de-Grâce military hospital. In 1914, he served as the senior medical officer of the 20th Army Corps, then of the French 8th Army, and following that, of the 10th Army. Finally, he served as general inspector of the medical corps at the headquarters of the commander-in-chief of the French armies. He held the rank of *medecin general inspecteur* (inspector general) of the French Army Medical Corps (second only to the surgeon general). After the war he was elected a member of the prestigious Académie de Médecine in Paris. In 1954 he was awarded the Grand-Croix de la Légion d'Honneur, the highest position in the order of the Legion of Honor. In his history, General Sieur voices—with remarkable frankness—his dismay that the same medical problems continually reappear throughout French military history: the consequence of the military's inability or unwillingness to learn from the medical corps' experiences.

THE EARLY PHASE OF THE DEVELOPMENT OF MILITARY MEDICINE IN FRANCE

The primary source of information for the first section of the chapter is volume 1 of the three-volume *History of military medicine in France* (Ref. 1).

After the victory of Julius Caesar over Vercingetorix at Alesia in 52 BCE, France (then called Gallia, La Gaulle) became a Roman province. The Romans built *valetudinaria* (large military hospitals) in various cities of the new province, notably in Lyon and Strasbourg. In each *valetudinarium*, some sections were devoted to wounded soldiers and others to the sick. Surgical instruments such as probes, and boxes for these instruments, have been

found in *valetudinaria*. Roman legions had no real medical corps or medical officer class, but had legion hospitals. As represented on Trajan's Column in Rome, primary assistance on battlefields was provided by fellow soldiers. Those called *medicus ordinarius*, *medicus cohortis*, *medicus legionis*, *medicus castrorum*, and *medicus chirurgicus* were probably what we now call medics, trained on the spot to deliver primary care. We know that they had specific equipment, such as bandages. Doctors (in the Greek sense) could be found in legions, but they were the personal physicians of high-ranking officers; Caesar, for example, had such a personal doctor. About 30 A.D., Scribonius Largus, a physician of Greek origin, followed Emperor Claudius during his campaign in Great Britain and published a book there on medications, entitled *Ad Caio Julio Callisto epistula*.

In the post-Roman era, Childerbert, the king of the Franc tribes, opened the first civilian hospital in Lyon in 542 A.D. During the following centuries, doctors and surgeons are seen in armies at war but only as personal physicians of kings, princes, generals, and others of high rank.

FRENCH MILITARY SURGERY IN THE 14TH, 15TH, AND 16TH CENTURIES

In the 14th and 15th centuries surgery had a spectacular development. In 1314 Henri de Mondeville published a book in French on the treatment of contaminated wounds. He advocated the cleaning of those wounds with water and alcohol, with early suture and alcohol dressing. Following Arab medicine, Lanfranc recommended in 1480 the application of a burning iron on bleeding vessels. In the same period, Guy de Chauliac described the four ways of dealing with wounds: suture, dressing with gauze or linen mesh, and section of a vessel followed by ligature or burning.

The 16th century is known for the Renaissance of arts and sciences. Magnificent castles were built everywhere and hospitals and medical schools opened in most large French cities. The surgeons of the Saint Cosmes and Saint Damien association built a teaching amphitheater in Paris in the late 1500s.

On battlefields the development of firearms had changed the pattern of injuries. Treatment of bullet wounds was based on the false conclusion that they were contaminated by gun powder, which was considered a poison. The application of burning oil was the standard treatment for all gunshot wounds, and was not reserved for those needing hemostasis. Ambroise Paré (**Fig. 1**) put an end to this procedure. Paré was a barber-surgeon who had trained for 3 years at the Hotel Dieu hospital in Paris. In 1536, he joined the armies campaigning in Italy under the command of King François I. Confronted with a large number of casualties and running short of oil, Paré could only clean and dress some of the casualties' wounds. The following morning he observed that these patients were doing better than those treated with burning oil. From then on he abandoned the burning technique and advocated wound cleaning and removal of all foreign bodies, including projectiles. He developed several instruments, such as probes and forceps, for that purpose. With the use of

artillery, the severity of limb injury increased as well as the indication for early amputation. Paré changed dramatically the technique of these amputations by ligating bleeding vessels instead of burning them. To improve the condition of war amputees he developed sophisticated metallic prostheses.

Back in Paris in 1545, Paré reported his experience as a war surgeon in a publication entitled *La méthode de traiter les plaies par arquebuses et autres batons à feu* (*Method for the Treatment of Wounds Caused by Harquebuses and Other Firearms*). This book on war surgery was the first of its kind in French, since Paré, who was a surgeon and not a doctor, did not speak Latin.

During the mid-16th century, conventions were signed for the first time between combatants to protect the wounded and sick. In 1552, Paré took care of numerous enemy casualties in Metz, when the defeated Charles Quint abandoned the town siege and left behind his wounded soldiers. During that campaign, the first temporary military hospitals were created, but did not prove to be very efficient.

Fifty years later, in 1597, under the guidance of King Henri IV, Sully (Reference 4) conceived the notion of two kinds of hospitals—ambulant and fixed—for sick and wounded soldiers. Ambulant hospitals were intended to follow the movements of troops, administer first aid, and direct the wounded to fixed hospitals. Although ambulant hospitals, and with them organized battlefield first aid, were not implemented at this time, fixed hospitals were. At the siege of Amiens, the first real French field hospitals (or houses for wounded), were established and functioned from 15 July 1597 to 25 September 1597. In 1630, Henri IV's successor, Louis XIII, decided to open permanent military hospitals, the first of their kind, at the borders of contested areas, like the one in Calais. Fifty permanent hospitals were established near the frontier and these, as being in the areas which were for centuries battle grounds of France, were regarded as adequate for the needs of armies mobilizing or camping in that neighborhood, whether in peace or war. This doubtless explained the total absence of any organization for first aid on the field of battle. Nevertheless, Sully's [minister of King Henri IV] and[, later,] Richelieu's [minister of Louis XIII] idea of organizing ambulant hospitals had not been entirely forgotten.

Bagieu, surgeon major of the police organization of the King's House, gives, in his *Treatise on Surgery*, some interesting details as to the service of these hospitals to the royal armies on campaigns: On the battle front, there is an ambulant hospital, not far from the field of action, which is the first station at which the wounded are assembled to be transported from thence to the nearest city hospital and to those further into the interior. Operating on the wounded is rarely done on the actual field of battle; amputations are even more rare. The slightly wounded proceed on foot to the depot (ambulant hospital); the more severely wounded are transported thither by vehicles. Sometimes, as at Fontenoy, this ambulant hospital sweeps the country. Ordinarily, it is installed in a building, more rarely in the city, and always at a sufficient distance from the field of action (Ref. 4).

THE CREATION OF A TRUE MILITARY MEDICAL CORPS BY LOUIS XIV

Under the reign of Louis XIV (1640–1715), the army and navy increased rapidly in size and reached a combined size of 500,000 men at the end of the 17th century. Medical needs increased as well. Along with multiple fortresses built by the engineer Vauban, permanent military hospitals opened all over the country. In 1674 the king inaugurated in Paris the impressive building of the Hôtel des Invalides, an institution open to 3,000 crippled or aging soldiers. Part of it still provides the same type of service today. This institution was copied in various foreign countries, notably in London where the Royal Hospital of Chelsea opened in 1692.

On 17 January 1708, Louis XIV issued a Royal Edict, which not only officially created a corps of career military physicians and surgeons but also stated the basic principles for establishing such a corps:

The important services now rendered by our troops commit us to the necessity of looking after their welfare and caring for their diseases and injuries, which, in our judgment, could not better be affected than by establishing for all time, in the rear of our armies, in our hospitals and theaters of war, general and special physicians assigned to the care of sick and wounded officers and soldiers, none being admitted to this service who have not been approved by our leading physicians and surgeons; the employment of these to be definite and their services continual with the same corps of troops or in the same hospital, whereby they will be better able to give useful aid to sick and wounded than those serving under temporary commissions, who cannot acquire the same experience and capacity and would not serve with the devotion which is assured by continuous service. (Ref. 4).

The corps initially was comprised of 12 inspectors (4 physicians and 8 surgeons), 100 hospital doctors (physicians or surgeons), and 159 regimental surgeons. Before the edict, physicians and surgeons were not considered to be officers and were only commissioned for the duration of a campaign. After the edict, they became career physicians or surgeons. It took 50 years before the medical personnel of the corps were given uniforms. Army surgeons got one in 1757, navy surgeons in 1767, and army physicians in 1775 (**Fig. 4**). Not until 1834 (120 years after the corps was created) were career military physicians and surgeons given the status of military officers (**Ref. 7**).

Pierre Dionis, the king's surgeon who also served as a war surgeon, published a surgical treatise in 1707 that included war practice. One of the volumes was devoted to the extraction of foreign bodies. All surgeons in the field were given this "portable book" on war surgical practice.

The condition of the corps and the recruitment of medical personnel and their training changed during the 18th century. Purchase of positions and commissions was suppressed by an ordinance of 1717, which assigned the recruiting of hospital personnel to a council composed of four advisory medical inspector generals and four advisory surgeon inspector generals. Recruiting of the regiments was a function of the chiefs of corps. There was

no mention of recruiting nor of instruction of personnel, but this deficiency was covered in part by the ordinance of 1725, which assigned to the surgeon major of each hospital the duty of visiting and examining, as to instruction, the junior candidates in surgery. It also prescribed that, *"as far as possible,"* a course of operative surgery and surgical anatomy should be given, which surgeons in hospital would be obliged to attend, so as to instruct and fortify themselves in the practice of their art and to train pupils who might be useful in their turn (Ref. 4).

It was only fifty years later, after many experiments and a perfect avalanche of regulations annulling or contradicting one another, that true schools of instruction were created in the hospitals of Lille, Metz, and Strassburg, under the name of amphithéâtres (order of December 23, 1725). The teaching personnel of each amphithéâtre consisted of first and second physicians, a surgeon major, and an aide-major. Under the name of demonstrator, the latter gave a winter course in anatomy and, with the surgeon major, a summer course in operative surgery and bandaging (Ref. 4).

A well considered program of instruction, which had no pattern in official instruction, was distributed over a period of three years and completed, at the end of each year, by *"a practical clinical course on the principal diseases existing among the troops of the armies and garrisons, with regard to the mode of life of the soldiers, their duties and their care."* Finally, a surgeon major conducted a course in venereal diseases (Ref. 4).

The edict of 1708 was silent as to the composition of subaltern personnel in the hospitals. Up to the Revolution, many of them utilized groups of men as nurses, according to their local resources, while the kitchen and the pharmacy were confided to Sisters of Charity (Ref. 4).

In 1781, following a general revision of all orders relating to military hospitals, a regulation appeared which was not to be modified until a century later, namely, by the first law tending toward the autonomy of the medical service (1882). The first article stated that all officers and employees of every hospital shall, without exception, be subordinated to the Commissaries of War, to whom they will render account of their services and be required to submit their registers whenever requested, under pain of disciplinary measures (Ref. 4).

From the time of Ambroise Paré and up to the Revolution, the most eminent physicians and surgeons of France led a half-civilian, half-military existence. When the Royal Academy of Surgery was founded in 1731, it was made up largely of military surgeons. Many of these who had acquired the title of surgeons to royalty, were professors in the Faculty of Medicine, or practiced their profession at the Salpêtrière or at the Charité, hospitals in Paris, at that time the most reputed centers for surgical work (Ref. 4).

Between the death of Louis XIV (in 1715) and the start of the revolution (in 1789), the material means at the disposal of the corps grew. Theoretically, there was an ambulatory hospital for each 20,000 men. New permanent military hospitals opened in several large towns. The largest, with 1,800 beds each, were those of Strasbourg and Metz. At the same

time, some innovative surgeons were thinking about organizational changes that could improve the delivery of medical care in the field:

In 1758, Ravaton, surgeon major at Landau, demands, in the section on gun shot wounds of his Treatise on Military Surgery, that sanitary brigades should be created to follow major detachments of the army. Their composition was to be: a surgeon aide-major, five pupils, and a chaplain, an apothecary, five male nurses, a clerk in charge and a caisson holding surgical instruments, appliances, sheets, a drug chest, medicines, wine, fresh bread, etc. This was the germ of the organization which Larrey gave to the Imperial Guard fifty years later (Ref. 4).

In 1766, military hospitals edited their first publications, Recueils d'observations de medecine des hopitaux militaires. The medical corps itself increased in size. In 1788, a year before the revolution, the corps had reached a combined strength of 736 physicians and apothecaries, an estimate made by Jean François Coste, then the chief army physician. Other observers had a far less sanguine impression:

On the eve of the revolution, the status of the medical service was about as follows:

- *an incomplete organization, changing at the caprice of each minister;*
- *an absence of all hierarchy with reference to officers of other arms of the service;*
- *subordination of the technical personnel to an incompetent administration, often hostile, and ever ready, under pretense of economies never justified, to disband personnel and suppress hospitals;*
- *a medical service deprived of nearly all ways and means of efficiency, particularly when the armies were operating far from important hospital centers;*
- *no special personnel for rounding up and relieving the wounded;*
- *transportation reduced to a few caissons, ordinarily used for carriage of materiel, or borrowed haphazard, as opportunity.*

Yet the medical service was never lacking in able men (Ref. 4).

ROCHAMBEAU'S ARMY DURING THE AMERICAN WAR OF INDEPENDENCE : 1780 - 1783

General Rochambeau (Jean Baptiste Donatien De Vimeur, Comte de Rochambeau, 1725–1807) landed at Newport, Rhode Island, on 11 July 1780 with a force of 5,500 French troops. He and his army spent the next 11 months west of New York. The headquarters was located in a farm near the Hudson River (in a village renamed Yorktown Heights in 1788, in honor of the 1781 Battle of Yorktown). The headquarters building, a handsome stone house, still stands and bears a plaque commemorating this historic period. On 10 June 1781 the troops left and walked south to meet the American forces, led by Washington and Lafayette, in Virginia. During the 800-mile drive to south, they averaged 15 miles a day, marching in oppressively hot summer weather, over poor roads. They forded waist-deep streams, manhandling heavy artillery of the Auxonne Regiment. The journey was made in 40 stages. They had a bloody confrontation with enemy troops in Baltimore, Maryland, where they lost 60 men. On 26 September 1781, the two allied armies met near Yorktown, Virginia, where General Cornwallis had fortified his position (**Fig. 3**). From there, Cornwallis' escape north by boats was made impossible by Admiral de Grasse's fleet. The Rochambeau contingent was then reinforced by 3,250 soldiers brought by the French fleet. The siege of Yorktown started on 16 October 1781, and ended in 13 days with the surrender of Cornwallis. That was the turning point of the American Revolution. The Rochambeau army established its winter quarters in Virginia, returned to the North by the same route in the summer of 1782, and embarked at Boston, Massachusetts, and at Portsmouth, Virginia, in December. General Rochambeau embarked on 8 January 1783 at Annapolis, Maryland, on the frigate *Emeraude*.

ORGANIZATION OF THE MEDICAL CORPS

A medical corps of 178 personnel support Rochambeau's troops. The director was Jean François Coste; he was assisted by Dr. Robillard, the chief surgeon. The composition of the medical corps was as follows:

■ medical personnel: 160

- doctors: 19 (17 surgeons, 2 physicians)
- medical students: 36
- pharmacists: 5
- nursing staff: 100 (4 majors, 96 ordinary nurses)

■ administration: 18

Coste was a brilliant military doctor (**Fig. 4**). He had begun to acquire a reputation in France and later became even more prominent. As a military physician and sanitarian from 1766 till his death in 1819, he held one position after another in the French Medical Corps.

He was the first elective mayor of Versailles and occupied this position for 2 years. He served under Louis XV, through the vicissitudes of the French Revolution, under Napoléon and Louis XVIII. With Lafayette and Rochambeau, he kept his head through the French Revolution, while many who had served with them in America went to the guillotine.

Jean François Coste, the son of Pierre Coste, a physician, was born on 14 June 1741 at Villes en Michaille, a little village near the Swiss border, north of Geneva. At 18 years of age he began his medical education in Paris, where the celebrated Antoine Petit, an old schoolmate of his father's, was a member of the faculty. He completed his medical education in Paris, but went to Valence for his final examination because it was less expensive there. After having received his medical degree at 22 years of age, he returned to Villes to begin practice with his father.

Very shortly after his return an epidemic broke out in Gex, near his home. A governmental order sent him there and he soon succeeded in checking the disease. His first published writing was an account of the epidemic. His management of it gained him the post of Médecin pensionné de la ville et états du pays de Gex (Physician paid by the town of Gex and the surrounding county). At this time he became acquainted with Jean Jacques Rousseau. He also met Voltaire and won his esteem *"by caring for the inhabitants of Fernay, where the epidemic also existed."* (Ref. 8). Voltaire was sufficiently interested in Coste that he wrote a letter of recommendation to the Duc of Choiseul, who appointed him physician to the hospital of Versoix. From there Coste was soon transferred to Nancy. While there, he wrote several articles and was admitted to the local academy. After that he was reappointed to the hospital of Calais. He remained there for 5 years, before the Duc de Choiseul appointed him chief physician to the army that the French were sending to America under Rochambeau.

Rochambeau's army left Brest on 12 April 1780, and reached Newport on 11 July. In anticipation of the arrival of the fleet, Commissary General of the French Army De Corny and Dr. James Craik went to Rhode Island. Dr. Craik had been sent by General George Washington to make the arrangements *"to provide hospitals and such refreshments as may be wanted in the first instance for the sick which may be on board the fleet of his Most Christian Majesty when it arrives."* (Ref. 9). After some difficulties, suitable quarters were found in Newport and Providence.

During the trip, Coste had found the French military pharmacy handbook too complicated and therefore inadequate so far away from France. Keeping only 79 formulas, he wrote a new one, in Latin: *Compendium Gallorum Nosocomii, in Orbe Novo Boreali*, which he finished on 25 July 1780. He had it printed by Henry Barber in Newport, Rhode Island, before the end of the year (Figure 5). Coste's *Compendium* was apparently the second war pharmaceutical handbook published in America. According to Garrison (Ref. 9), the first one, likewise for use in military hospitals, was prepared by Dr. William Brown of Virginia for use in the Continental Army and was issued anonymously from the military hospital at Lititz, Pennsylvania, in 1778. A second edition was published under the author's name in 1781.

Shortly after Coste arrived in America, the Humane Society of Philadelphia requested, through the French ambassador, that he write an article on asphyxia (*Mémoire sur l'asphyxie*). Following that, Coste was elected to membership in the society (**Exhibit 1**). During the siege of Yorktown, Coste organized four hospitals in Williamsburg, then the capital of Virginia. He remained there until the spring of 1782. His actions for the wounded of all nationalities, French and American as well as British, were recognized by the young University of Virginia, which organized a reception in his honor. It took place on 12 June 1881 at the capitol building in Williamsburg. Coste lectured in Latin during the reception; his biographer, Dr. Bonnette, reports that:

the oration was long and learned and perhaps one of Coste's French biographers was not mistaken in saying that *"the learned body of this Society listened religiously, and was astounded at the scientific attainments, the talent and the lofty eloquence of our compatriot,"* and that at its close, *"long applause greeted this peroration. The entire audience rose and gave an imposing ovation to the eminent orator who had bound it with the charm of his science and of his oratory."* (**Ref. 10**). (A translation of Coste's lecture, *The Adaptation of the Ancient Philosophy of Medicine to the New World*, is held in Paris at the Val-de-Grâce Library) (**Ref. 11**).

On 12 June 1782 Coste received the honorary degree of Doctor of Medicine from The College of William and Mary in Virginia. This appears to have been an unusual honor, for according to the records of the college, honorary degrees were rarely bestowed and their recipients were men of highest distinction. The list up to the end of that year is short:

- Benjamin Franklin, A.M., 1756
- Chevalier de Chastellux, General in French Army, LL.D., 1782
- John F. Coste, First Physician in French Army, M.D., 1782
- Thomas Jefferson, LL.D., 1782.

No other degrees were conferred until 1790 (**Exhibit 1**).

After leaving Williamsburg, Coste certainly visited Philadelphia for, according to the records in the office of the Dean of the Medical School of the University of Pennsylvania, the *"Honorary Degree of M.D. was conferred upon Johannes François De Coste, Physician General to the French Army in America, on December 23, 1782."*

The bulk of Rochambeau's army left America from Boston in December 1782. Coste certainly remained with the nontransportable sick and wounded since he received his Pennsylvania degree in person, and also was elected to the American Philosophical Society on 18 January 1783.

Coste was often homesick. The soldiers saw him more than once standing on the seashore of the New World with his eyes turned toward France. One of his friends, an officer, surprised him one day in the midst of his homesick reverie. Coste said, *"It is a piece of childishness that will make you laugh, but I cannot resist seeking in the fantastic shapes of the waves, the illusion of my beautiful mountains of Bugey."* (**Ref. 8**).

The French government recognized Coste's services to the army in America by bestowing a brevet of Medecin de la Marine and a pension of 3,000 francs. In addition, George Washington was aware of Coste's contribution to the well-being of all soldiers, and before he departed for France wrote a letter of appreciation to Coste (**Exhibit 2**).

In 1793 the Val-de-Grâce, a convent in Paris, was turned into a military hospital. In 1796 when it became a teaching institution, Coste was appointed the first director and had under his tutelage the young Dominique Larrey as professor of anatomy and surgery (**Fig. 6**). In 1805 Coste was promoted to the position of surgeon general for Napoléon's Grande Armée, a position that he occupied until 1807. He died on 8 November 1819, in Paris, at the Hotel Royal des Invalides, the hospital and house of the veterans where he was then serving as director (**Ref. 8**).

ACTIVITY OF THE MEDICAL CORPS DURING THE AMERICAN CAMPAIGN

Upon arrival in America, the medical corps had to deal with 700 soldiers and 1,000 sailors suffering from illness, exhaustion, scorbutic deficiency, and other ailments that were caused by 71 days on the high seas aboard 32 overcrowded transport ships. The landing of the sick took 4 days. Four hundred men were hospitalized at Newport, 280 at Papoosquash Point, and 300 were sent to Providence.

Blanchard, Commissary of the French forces, records that, with Coste and Demars, the steward, he visited Papoosquash on 13 July to *"examine an establishment which Mr. De Corny had arranged for our sick"* and that *"on July 19, there were already 280 sick there."* In that visit Blanchard also noted that *"the American women were generally pretty and the bovines as handsome as those of Poitou."* (**Ref. 8**).

In September about one tenth of the army was sick. Many had dysentery, which did not seem to be dangerous. With Blanchard, Coste made a new inspection and on 12 September found the hospital of Providence to be *"in very good order."* (**Ref. 8**). By December, however, the cold was very severe, and Admiral De Ternay was taken sick and brought ashore. Coste was sent for, but despite his efforts, the admiral died at the house of Joseph Wanton of *"putrid fever"* on 15 December 1781.

The sickness among the troops had probably disappeared before they left New England, for on the march between Newport, Rhode Island, and Yorktown, Virginia, cases of sickness were rare. Abbé Robin says that the attention of the superior officers very much contributed to this by the care they took in obliging the soldiers to drink no water without rum in it to remove its noisome qualities. (**Ref. 8**).

During the siege of Yorktown, the medical corps had no physicians directly positioned in the battlefield. That was the rule of the time. It took 12 more years and the action of Larrey and his ambulance volante (flying ambulance) to have it changed. The closest teams were

2.5 miles away (3 French lieues) from the front. A field hospital run by Coste and Robillard, the chief surgeon, was located at the rear of the Yorktown sector, which was held by the French troops. Nearby, in the rear of Lafayette's headquarters, the field hospital of the American wing of the army was located; the previously mentioned Dr. James Craik was in charge. Also serving at this hospital were Dr. James Thacher and his assistant, Dr. Aeneas Munson, both American physicians.

From there the casualties were evacuated to one of the four hospitals installed by Coste in Williamsburg. During the battle, these French hospitals treated the wounded from all sides, friend and foe alike, as C.-S. Robin described in an official letter, dated 6 November 1781, from the front at Yorktown:

"Some enemy soldiers were transported into our hospitals. These men and our wounded who a while before were trying to kill each other were reunited under the same roof. They were cared for without any difference." (Ref. 12).

At the end of the 14-day battle, on 19 October, the destruction in Yorktown was appalling. James Thacher, who joined Washington's army in 1775, entered into the town 3 days later, on 22 October. He wrote the following in his diary:

"I have this day visited the town of York, to witness the destructive effects of the siege. It contains about sixty houses, some of them are elegant, many of them are greatly damaged and some are totally ruined, being shot through in a thousand places and honey combed ready to crumble to pieces. Rich furniture and books are scattered over the ground, and the carcasses of men and horses half covered with earth, exhibited a scene of ruins and horror beyond description. The earth in many places is thrown up into mounds by the force of our shells, and it is difficult to point to a spot where a man could have resorted for safety."

The loss on the part of the French during the siege, was fifty killed and one hundred and twenty seven wounded. Twenty seven Americans were killed and seventy three wounded, officers included. Cornwallis account of his loss during the siege is one hundred and fifty six killed, three hundred and twenty six wounded, and seventy missing, probably deserted, total five hundred and fifty two. The whole number surrendered by capitulation, seven thousand two hundred and forty seven. (Ref. 13).

On the French side, Thacher's estimates were far too optimistic. During the siege of Yorktown, Rochambeau's army suffered a total of 300 killed in action. The fleet and its marine corps recorded a similar number of casualties. As Thacher mentioned, at the end of the siege, the British side had a great number of wounded because of heavy artillery shelling. At the time of surrender, the fate of those wounded was discussed. The agreement signed by Washington, Rochambeau, and De Grasse included the following two articles:

Article XI: Proper hospitals are to be furnished for the sick and the wounded. They are to be attended to by their own surgeons on parole, and they are to be furnished with medicines and stores from the American hospitals.

Article XII: Wagons to be furnished to carry the baggage of the officers attending the soldiers, and to surgeons when traveling in account of the sick, attending the hospitals at public expense. (Ref. 1).

The wounded were treated in the hospitals of Williamsburg until July 1782. Dr. Thacher wrote the following description of the town at the time of the siege:

[Williamsburg] is the capital of Virginia, but in other respects is of little importance. It is situated on a level piece of land, at an equal distance between two small rivers, one of which falls into York, the other into James River. The city is one mile and a quarter in length, and contains about two hundred and fifty houses. The main street is more than one hundred feet in width, and exactly one mile in length—at one of the extremities, and fronting the street, is the capitol, or state house, a handsome edifice, and at the other end is the college, capable of accommodating three hundred students, but the tumult of war has broken up the institution. The college is about one hundred and thirty feet in length and forth in breadth, with two handsome wings fifty by thirty. Their library is said to consist of about three thousand volumes. Near the center of the city is a large church, and not far from it the palace, the usual residence of the governor, which is a splendid building. The water in this vicinity is extremely brackish and disagreeable. (Ref. 14).

During the siege, according to Dr. John E. Lane, Coste's biographer, *[t]he College of William and Mary was given over to the French army and was used as a hospital. During their stay the College Building was damaged and the President's house was burned. This was repaired later and the President's house rebuilt at the expense of the French Government. (Ref. 8).*

Dr. James Tilton visited the French hospital there and wrote the following report: *After the siege and capture of Yorktown in Virginia, Gen. Washington returned to the northward and the French troops were cantoned in Williamsburg. I was left in charge of the sick and wounded Americans, who could not be moved. Being thus in a French garrison, I had some opportunity of observing the French practice and management of their sick. In passing the wards of their hospital, their patients appear very neat and clean, above all examples I had ever seen. Each patient was accommodated with every thing necessary, even to a night cap. Nevertheless, they were not more successful than we were. Even their wounded, with all the boasted dexterity of the French to aid them, were no more fortunate than ours. I was led to attribute their failure principally to two causes. For ease and convenience, they had contrived a common necessary for their whole hospital, the college, a large building, three stories high, by erecting a half hexagon, of common boards, reaching from the roof down to a pit in the earth. From this perpendicular conduit doors opened each floor of the hospital; and all manner of filth and excrementitious matters were dropped and thrown down this common sewer, into the pit below. This sink of nastiness perfumed the whole house very sensibly and, without doubt, vitiated all the air within the wards.*

In the next place their practice appeared to me to be very inert. When passing their wards, with the prescribing physicians I observed a great number of their patients in a languid and putrid condition, and asked, occasionally, if the bark would not be proper in such cases. The uniform answer was no, too much inflammation. And when they attended my round of prescription and saw me frequently prescribe the bark, in febrile cases, and even for the wounded, they lifted up their hands in astonishment. Few or no chemical remedies were employed by them. One of their regimental surgeons declared that he never used opium. Their hospital pharmacopia [undoubtedly Coste's Compendium] consisted chiefly of potions, decoctions and watery drinks, fitted only for inflammatory disorders. All these circumstances considered, satisfied my mind, why their ample accommodations gave them no advantage of us, in the result of practice. I was the more surprised, as Doctors Coste and Borgelli both appeared to be men of science, well qualified to make research (Ref. 15).

When the troops started moving north before their departure for France, Coste sent those who were still hospitalized either into a field hospital established in Baltimore or aboard the *Romulus*, which was transformed into an hospital ship. In December at the time of embarking, 700 were considered as nontransportable. With the support of the medical corps, 400 of them remained hospitalized in Baltimore, and 300 on the *Romulus*. Most of them finally left on 11 May 1783; the remainder, on 5 October.

In honor of those who died during the battle, on 14 October 1989, Mr. De Margerie, the French Ambassador to the United States, inaugurated a monument on the Yorktown battlefield above the James River (Ref. 16). It is a semicircular wall; one side is oriented north, facing the water, the other side faces south, the battlefield. The names of Rochambeau's soldiers who lost their lives in Yorktown are engraved on the southern side; on the northern, those of de Grasse's sailors and marines (Fig. 7).

During its entire American campaign, the Rochambeau expeditionary corps and its reinforcement by the de Grasse contingents lost a total of 1,926 men (about 25% of its initial strength). In addition to the casualties at the Battle of Yorktown, several more were killed in action in various places; for example, 60 perished in Baltimore. Others died of infected wounds or from diseases.

King Louis XVI, represented by Lafayette, began France's support of the American insurgents in 1777. By 1783, when fighting stopped, a total of 2,112 Frenchmen had lost their lives for the independence of the United States of America. Thanks to the research of Warrington Dawson in the archives of the time, a list of these courageous men was published in 1936 (Ref. 17). For most of these casualties, the list gives dates and places of birth and death. It also provides data on the causes of death and when and where they died in a hospital. This information transforms anonymous names into human beings who suffered and lost their lives while making history.

FROM THE REVOLUTION TO THE END OF THE FIRST NAPOLEONIC EMPIRE: 1789–1815

The primary source for this section is volume 2 of the *History of military medicine in France*, edited under the supervision of the Comité d'Histoire du Service de Santé (Committee for the History of the French Military Medical Corps). (Ref. 2)

The French Revolution started in 1789 and swept throughout the country during the next 3 years. The execution of Louis XVI and the excesses of the Terror led to the first external war in 1792. France was at war with the European monarchies almost without interruption until the fall of Napoléon in 1815. With a population of 29 million, France was by far the most densely populated country on the continent. The revolutionary government initially raised an army of 300,000 draftees, compensating with numbers for the lack of experience and leadership. After initial setbacks, the French Republican Army defeated the coalition of Prussian, Austrian, Russian, and Italian armed forces (Fig. 8–9).

During the Napoléonic Empire, the trend toward larger armies continued: the Grande Armée, which invaded Russia in 1812, consisted of 500,000 men. The allied armies responded in kind, and the battles that followed involved more troops than had previously been seen. In addition, the role of field artillery increased under the influence of Napoléon, who was trained as an artillery officer. These two factors, large concentration of troops and extensive use of artillery, led to a dramatic increase in mass casualties. The carnage in single-day battles had seldom reached such magnitude (Ref. 18):

- 24,000 casualties at Austerlitz on 2 December 1805;
- 60,000 casualties at Jena on 14 October 1806;
- 56,000 casualties at Eylau on 8 February 1807; and
- 35,000 wounded on the French side alone at Borodino on 7 September 1812; 13,000 French would ultimately die at Borodino, for a total of 80,000 deaths on both sides.

During World War I such numbers were approached but not surpassed in a 1-day, one-site battle. It took a century and a half, and atomic bombs, for more to occur. The medical corps (Fig. 10) expended its personnel in proportion to the number of battalions involved. It had to cope with the double challenge of dealing with a multitude of injuries and epidemic diseases spreading in large concentrations of troops.

At the beginning of the war with the rest of Europe, important aspects of the administrative foundation of medical support for Napoléon's army arose from this period. In 1792, the National Assembly created military hospitals, both sedentary and ambulant. Public buildings, convents, and castles were now transformed into hospitals; but as it was complained that the means for feeding, bedding, and transporting the patients were faulty, the Convention decreed on November 17, 1792:

1. That all municipalities in which ambulant hospitals have been established, or even neighboring municipalities, were required to furnish to medical officers as many mattresses as there were wounded.
2. That the Ministry of War should supply, as soon as possible, suspended and covered chariots to follow in the rear and transport the wounded to hospitals.
3. That the Minister of War should, on three days' notice, render an account of abuses in hospital administration and of the means taken to punish their authors.

To these hospitals, hospitals at watering places in the interior were added and the armies were supplied with special hospitals for patients afflicted with venereal diseases or scabies. The ambulant hospital in the rear was to be capable of splitting up into as many detachments as the size of the army, its position, the season of the year, the ground, and the military circumstances might require. This detail is accentuated in the regulation of flourens, an IV (1796), as based upon the experiences of preceding wars, specifies that ambulant hospitals are intended solely for the administration of first aid. Sick and wounded soldiers thus relieved are to be sent immediately to the sedentary hospitals of the first and second lines.

Here then, for the first time, is organization for relief on the battlefield, with evacuation in stages according to precise and rational regulations (**Exhibit 3**) (**Ref. 5**).

It is interesting to note that in 1805 Napoléon ordered the smallpox vaccination for all troops under his command. During this period, physicians serving in the military faced two major administrative problems:

1. The medical corps was not autonomous. It was under the administration of the intendance (ie, an agency with an enormous centralization of power), the purveyor of *"the services of supplies, transportation, finance, and judiciary"* for the army. (**Ref. 4**) That situation was the source of multiple conflicts with military physicians, particularly with Percy, one of the most famous surgeons of the time.
2. Doctors were not considered to be military officers, although they had military ranks; they were medical officers who worked under temporary commissions and could be dismissed instantly without pensions.

The medical corps to fulfill its mission encountered enormous difficulties due to its administrative subordination and the lack of military status for its personnel. It is plain, from the innumerable decrees which followed one another during the Republic and the Empire, that medical officers were regarded by the different ministers of war as simple employees of the army, without rights or official status, to be discharged from the service at discretion (**Ref. 4**). To make these measures more odious and to justify the decision of the minister, the following preamble was ventilated by the three inspectors making up the Council of Health: The medical service of the army rests only upon temporary commissions. When peace is signed, the medical officer who has not acquired a titular position in a military hospital will be dropped automatically from the service; the claims of those retained by the Government are only individual. In brief, there is no medical service in the proper sense of the term.

One can imagine the wrath excited by such a note, emanating from those who, given their right positions, should have constituted themselves the ardent defenders of the men who, upon every field of battle, had given proof of the utmost devotion and had contributed largely to the assurance of a peace, which everyone hoped would be definite. But it was reserved for the Empire to aggravate the situation of the medical service, and this is by far the most somber period in its history. Although Napoléon raised to the nobility such men as Percy, Larrey, Desgenettes, Heurteloup, and other physicians and surgeons attached to his Guard, although, at the [insistence] of Larrey, he gave the latter an ambulance service which almost attained to perfection in the period, he would not or could not give to the rest of the army that battle organization of surgery which Percy demanded with such insistence. Following the suppression of the hospitals of instruction, recruiting fell to nothing (Ref. 4).

It was therefore necessary to commission young men who had just attained to the requisite age, and who were often without instruction, most of them coming under Percy's contemptuous designation of "*slop-shop surgeons*" ("*chirurgiens de pacotille*"). (Ref. 4).

However, the corps fulfilled its mission of caring for the wounded and did it efficiently, if we believe the statistics provided by Larrey. Between the end of the Battle of Bautzen (1 May 1813) and before the Battle of Leipzig (1 June 1813), during a time of little actual fighting, Larrey performed a survey of the wounded in a selected group of field hospitals and found that only 10% of hospitalized soldiers died from their wounds (Ref. 2). The cost to the corps in terms of human life, however, was high:

On the 7th frimaire, an III (1795), Fourcroy pointed out to the Convention that more than 600 medical officers had perished during the last eighteen months, either on duty or in consequence of duties rendered (Ref. 4).

The three most prestigious medical figures in the Napoléonic era are two surgeons and a physician (hygienist and epidemiologist): Dominique Larrey, Pierre François Percy, and Rene Nicolas Dufriche Desgenettes.

DOMINIQUE LARREY

Dominique Larrey (Fig. 11) was born on 18 July 1766 in Baudean, a little village in the French Pyrenees. The family house where he was born still exists and is being transformed into a museum devoted to him. His father, a cobbler, died when Dominique was 14 years of age. He moved then to Toulouse, where one of his uncles was a surgeon. With the help of his uncle, Larrey studied medicine and then surgery.

In 1787, at the age of 21, he became a navy surgeon and embarked for Newfoundland. In September 1792 he joined the Army of the Rhine and had his first battle experience at Phalsburg. This was the beginning of his extraordinary career as a war surgeon. In the Rhine valley, according to the deployment doctrine of the time, Larrey and his team were

located 4 km (une lieue) from the battlefield. They were supposed to wait until the end of the battle before being allowed to come to the site of the fighting and take care of the casualties. Larrey was outraged. Without permission and instead of waiting, he rushed to do what he could for the wounded soldiers. Far from being punished, he was promoted. From that date forward, Larrey and then all surgeons on the French side (and later on the opposite side) were allowed to provide care for wounded soldiers during battles. Larrey then said to General Houchard, his commander:

"You have a flying artillery, I would like to have flying ambulances to evacuate those casualties who cannot be treated on the battlefield." (Ref. 19).

The idea was discussed and the concept approved by a national Health Council held in Paris in February 1793. A competition was then organized to develop the most suitable ambulance models. Two types of ambulances were selected by Larrey, a two-wheel model for two soldiers, and a four-wheel model for four supine casualties (Fig. 12). Larrey and his teams (Fig. 13) were then allowed to go quickly to the battlefield, where they had two options: they could operate if they thought it appropriate, or they could evacuate the patient to another echelon of care (Exhibit 3).

The illustrations and paintings of the time, as well as the reports written by Larrey, show him operating either on the battlefield or in an operating emergency post located away from the battlefield. In 1809 he was with the Imperial Guard when this formation took the Island of Lobau on the Danube River, outside the Austrian capital, Vienna. Larrey wrote: *"My field dressing station was at the edge of the wood on the left bank, and here we operated all the severely wounded, both of the Guard and the line. The less serious casualties and those who could safely be moved were carried as quickly as possible to dressing stations on Lobau."* (Ref. 20).

In this report, Larrey described the categorization of wounded according to the severity of their wounds and consequently the degree of priority for their treatment. This process is what we now call triage. If he did not use the term triage, he created the conditions for it and put it into practice (Fig. 14). He also described the various echelons of care that characterize modern military surgery. For 23 years he would be involved in all military campaigns conducted initially by the revolutionary government and then by Napoléon. He practiced surgery throughout Europe, from Madrid to Moscow, from Rome to Berlin; and outside Europe, in Malta, Egypt, and Syria.

As a surgeon he certainly was one of the best of his time (Fig. 15). He was an expert in amputation and could do one in just a few minutes (Fig. 16). He is said to have set the record of 200 during the Battle of Borodino in Russia in 1812. He developed techniques that were well in advance of his time, such as the shoulder disarticulation (amputation of the arm through the shoulder articulation). He could do one in less than 2 minutes. In Borodino he performed 11 of such disarticulations, with only 2 deaths.

Larrey's accomplishments were numerous and of great value. He had 23 uninterrupted years of service in wartime and participated in 400 battles. He was loved not only by the French soldiers but also by their enemies. He was the first to advocate treatment of all the wounded, whoever they were (**Fig. 17**). He has been quoted many times as saying to his assistants in 1796, *"In the field, treat first the more severely wounded whatever their rank or nationality, friend or foe."*

In his will, Napoléon wrote of Larrey: *"He is the most virtuous man I have ever met."* (**Ref. 20**). This view was shared by other high-ranking personages of the time, such as Czar Alexander of Russia, General Field Marshal Blucher of Prussia, and the Duke of Wellington of England. At Waterloo, Wellington stopped the bombardment of a French position when he realized that Larrey and his ambulances were in the middle of it. Then, Wellington then took off his hat to salute. Standing nearby, the Duke of Cambridge asked him, *"Who are you saluting?"* *"I salute the courage and devotion of an age that is no longer ours,"* Wellington replied, pointing with his sword in the direction of Baron Dominique Jean Larrey (**Ref. 20**).

In 1793, the convent of Val-de-Grâce was transformed into a military hospital. In 1796, this hospital, which kept the name Val-de-Grâce, became a teaching institution. Larrey was appointed the first professor of surgery and anatomy. He stayed at Val-de-Grâce until his departure for Egypt with Bonaparte's expeditionary corps in 1798. He developed his academic talent for teaching and writing; he loved teaching and as often as he could he organized surgical seminars for his assistants. They took place all around Europe: in Milan, Vienna, Berlin, and other cities. His foreign counterparts, from the enemy side, were invited to share their experience in such meetings. He was known and appreciated in the surgical arena by all his European colleagues. When facing a firing squad at Waterloo, his life was saved when he was recognized by a Prussian surgeon who had met him in Berlin at one of those meetings.

A final factor influencing Larrey's long-lasting fame is his written contribution to military surgical literature. During all his campaigns, despite the difficulties, he took notes. As soon as he could return to Paris, he wrote and published; Larrey is probably the most prolific writer in military surgery. He left several volumes that were translated into various foreign languages, including English. In the last century, they remained the bible for war surgeons until the end of the 1870s.

He was the chief surgeon of the Imperial Guard but for a long time was frustrated at not becoming the surgeon general of Napoléon's Grande Armée. He finally reached this position during the last campaign, which ended at Waterloo in 1815. He was then retired from the medical corps by the reinstated Bourbons. He died in Lyon on 25 July 1842 at the age of 76, at the end of an official mission in Algeria, a few hours before the death of his wife in Paris.

OUTCOME OF SELECTED FRENCH CASUALTIES AS OBSERVED BY LARREY, 1 MAY – 1 JUNE 1813

Disposition of Wounded	Total* Wounded	% of Total*
Totally Healed	6,703	28
Partially Invalid	4,027	17
Totally Invalid	3,544	14
Died from their wounds	2,416	10
Remaining hospitalized	8,000	13

* The word "total" actually denotes a subtotal of the casualties during this month. Larrey studied only the hospitalized casualties within his physical proximity. Adapted with permission from Comité d'Histoire du Service de Santé. *De la Révolution française au conflit mondial de 1914. Vol 2.* In: *Histoire de la Médecine aux Armées.* Paris, France: Charles-Lavauzelle; 1984: 62

PIERRE FRANÇOIS PERCY

Pierre François Percy (1754–1825) rivaled Larrey in fame (Fig. 18). To reach the wounded as quickly as possible, he equipped his teams with elongated caissons or artillery wagons—called Wursts (Fig. 19). Surgeons riding on the wursts could reach the casualties quickly; the surgeons were handicapped, however, because they had only a minimum of matériel and instrumentation at their disposal to treat the wounded. Percy’s concept of battlefield provision of medical care was not accepted. Although during the Italian campaign Napoléon had been satisfied with Larrey’s flying ambulances (and their military organization), which were exclusively for the Imperial Guard, the emperor “remained deaf to all verbal or written requests from Percy, [who requested] that this benefit should be extended to the entire army.” (Ref. 5).

In 1800, during the Napoléonic Wars, Percy tried to work out an international agreement to make all wounded soldiers and their surgeons neutral parties to war: [W]hile in the army of the Rhine, he succeeded in securing an arrangement between [General] Moreau and the Austrian General, Kray, whereby military hospitals were to be treated as inviolable asylums, no matter in what army or upon what territory they were established. Each army had charge of its own hospitals, even when it had lost the terrain upon which they were established. It had also to reimburse the enemy for any expenses incurred in treating patients in hospital. The location of hospitals was indicated by sign-posts notifying passing troops to move away and make no noise that might disturb the patients. When the latter were healed of their wounds, they were returned to their respective armies by escorts, who were required to furnish them transportation and victuals en route and to accompany them to the outposts. While this convention did not last long, it is none the less an honor to its originator [Percy]. The Geneva Convention, fifty years later, did very little more (Ref. 5).

Although Percy was named surgeon general of the Grande Armée at two separate periods of his military career (1800–1805 and 1813–1814), he was unable to convince Napoléon of the necessity to reorganize the medical service on a military basis, or even to compen-

sate the surgeons. According to General Sieur, Napoléon's interest in medical support was for its propaganda value. When the emperor saw the devoted medical care the wounded received, he would often cry: *"Ah, my brave surgeons!"* His interest in them was, however, limited to this statement.

Desirous of assuring at least some moral compensation for the services and devotion of his colleagues, to whom the administrator of war had refused all financial compensation, even requiring them to furnish their own equipment and mounts, Percy finally demanded that they might *"at least be permitted to wear the epaulets of the grade to which they had been assimilated by law."* He was told that his request could not be granted inasmuch as a royal decree [by Napoléon] would be necessary to make "officers" of the "higher surgeons," which was impossible. The species of voluntary helplessness, with which the Emperor invested himself with regard to the medical service, was utilized by the administration to trample down medical officers, humiliate them, and even outrage them by means of innumerable circulars, but had Napoléon stood by them, he might have preserved more effective personnel than he ever acquired by repeated conscriptions (Ref. 4).

Percy also created the first corps of military male nurses (Fig. 20). During the Peninsular campaign in 1808, Percy wrote to Major General Berthier, Napoléon's chief of staff, attributing the heavy hospital mortality to overcrowding and the lack of bedding, food, and drugs. He wrote that because: *"there is only a single French nurse in the whole army, the sick and wounded are very miserable and badly attended. ... It is time, my dear sir, that I should have at my disposition 400 soldiers, mutilated voluntarily or by accident, of the class of men who follow the army at a distance without ever joining it, so that I can turn them into nurses, with a distinctive costume, a definite enrollment, good commanding officers, who might distribute them by squads in the hospitals nearest the army and in the rear of the surgical stations on the battle front, to render us the services of which we are at present deprived."* This time, Percy was heeded (Ref. 5).

RENE NICOLAS DUFRICHE DESGENETTES

Rene Nicolas Dufriche Desgenettes (1762–1837) became Doctor of Medicine in 1789 (Fig. 21). During the Italian campaign, he proved to be an efficient hygienist. Bonaparte made him the chief surgeon of the expeditionary corps to Egypt. During his stay in the Middle East, he had to deal with pestilence of epidemic proportions (Fig. 22). Later in Europe, he was confronted with major typhus epidemics. He reported that in the last 3 months of 1813, the garrison of Torgau in Germany lost 13,448 of 25,000 men to the disease.

In 1807, Desgenettes was promoted to the position of surgeon general of the Grande Armée, succeeding Coste, until 1813 when he was taken prisoner by the Russians. At Waterloo in 1815, however, he graciously accepted the lesser position of chief surgeon of the Imperial Guard so that Larrey could occupy his previous prestigious position as surgeon general of the Grande Armée.

FROM WATERLOO TO THE END OF THE SECOND NAPOLEONIC EMPIRE : 1815 - 1871

The primary source for this section is volume 2 of the *History of military medicine in France*, edited under the supervision of the Comité d'Histoire du Service de Santé (Committee for the History of the French Military Medical Corps) (Ref. 19).

Between Waterloo in 1815 and the Sedan disaster in 1871, France was involved in six major conflicts (Fig. 23–24). The first was an expedition into Spain (1823–1825); the second, the conquest of Algeria (1830–1847). The four others occurred during the Second Empire: the Crimean War (1854–1855), the war for the independence of Italy (remembered for the terrible Battle of Solferino in June 1859), the expedition into Mexico (1861–1867), and finally the Franco—Prussian War of 1870–1871, which ended with the fall of Napoléon III. In addition there were two expeditions to the Far East: one to China in 1860, and one to Indochina in 1861.

In May 1834, military physicians were finally and completely recognized by law as officers, a major step in the recognition of the medical corps as a component of the military establishment. This law is still valid today and this date is a real landmark for the medical corps. In August 1850, a military medical school (Ecole d'application de la Médecine Militaire) was created at the Val-de-Grâce Hospital in Paris. Its mission was to teach young doctors what makes military medicine, and especially surgery, different; for example, the difficulty of operating in austere environments, and the different causes and kinds of injuries, the echelons of care, dealing with mass casualties, and so forth. The school still exists today, with a similar goal. In 1856, the Imperial School for the Military Medical Corps (Ecole Imperiale du Service de Sante Militaire) was created. It was located in Strasbourg and was supported by the civilian medical school in the town.

During the Algerian War, where the problems of the medical corps were more medical than surgical. Disease, during the whole Algerian campaign, became a matter of capital importance, due to the necessity of fighting in the dry season over a country without roads, of changeable climate, of torrid character in the hot season, with torrential rains in the winter months and sometimes with cold waves accompanied by disagreeable snowfall, which was to take many victims (Ref. 5). *"The night of October 8–9, 1837,"* writes Baudens, *"was frightful; a lashing bitter cold rain fell without interruption, and, reduced to a biscuit ration, we utterly lacked shelter and fire. The sick and dying were everywhere."* (Ref. 21).

The losses from wounds were as nothing compared with those from diseases. For many years, the cholera, imported into France, had its numerous victims and in 1835, it killed nineteen medical officers out of twenty-three effectives. Typhoid fever was at first confused with typhus and paludism [malaria], with which it was supposed to form an unusually dangerous mixed infection, known as typho-malarial fever. Typhus and paludism

were permanent pests in the expeditionary force. Intermittent fever was not entirely unknown to the French army, which had already experienced its terrible effects at Rome, Mantua, and the Low Countries, and even in some French garrisons. But the losses during the first years of the Algerian conquest were so high that the army in the field was split up and reduced in strength with frightful rapidity from the mortality and evacuation of wounded. Many times in a year it was necessary to call upon the mother country for reinforcements in considerable proportion to replace the dead, the dying, and the sick. Public opinion and the legislative chambers were aroused; the question of abandoning Algeria was considered. It was then that Maillot (François Maillot (1804–1894), a military physician who became Professor of Medicine at Val-de-Grâce and ended his career with the rank of inspector general) arrived at the garrison in Bône, which had just lost 1,100 officers and men out of an effective strength of 5,500. Thanks to quinine, which he introduced in a systematic manner, the mortality fell from 25 per cent to 5 per cent. (Ref. 5).

The scheme of therapy standardized by Maillot was so strange to official doctrine of the time that he was inactivated for a period, as a disciplinary measure, so that he would have had to live to the age of eighty-four to acquire a retired pay of 6,000 francs (Ref. 5).

During the Crimean War, the expeditionary corps ultimately reached a strength of 150,000 men. During that time it was decimated not only by fighting (Fig. 25) but also by epidemics of cholera and scurvy, and by cold weather. The term trench foot first appeared during this campaign. In 1865, a military surgeon named Chenu published a report of the casualties in the Crimea. Of 309,144 admissions into one of the hospital facilities, 80,590 soldiers died either of injury or disease (Fig. 26). Another 15,025 died during or after their repatriation to France. Both the French commander, Marshall Le Roy de Saint-Arnaud, and the British commander, Lord Raglan, died of cholera (Saint-Arnaud in 1854 and Raglan in 1855) (Ref. 22).

The medical corps was not immune to losses: *[T]he Crimean War made a great hiatus among the medical officers of the expeditionary force, for eighty-three out of 550, or one in six, had lost their lives in the campaign* (Ref. 6).

The lack of military medical preparedness for the Crimean War was obvious. In spite of his famous proclamation, “*The empire means peace*”, the reign of Napoléon III witnessed a series of wars which, whether resulting in victory or not, were all of them veritable disasters from the viewpoint of sanitation. The first in order of time was the Crimean War. It took place in a period in which the medical service, disorganized by the decree of 1852, which had suppressed the assimilation of grades and had again subordinated it to the intendance, found itself lowered in morale, technically impotent and numerically inadequate. Upon the declaration of war, it was not possible to designate a sufficient number of physicians for participation in the expeditionary force. The troops were going into a campaign in which they would be exposed to the fatigues and dangers of a long siege, the rigors of an unusually harsh climate, and murderous epidemics. “*With all reservations*”, said Scrive (Gaspard Scrive (1815–1861), surgeon general for the expeditionary corps to Crimea), “*there were fewer medical officers and veterinarians.*” (Ref. 6).

Among others, General Sieur was highly critical of the direction of French military medicine during the Crimean War, and saw some of that war's official attitude toward military medicine repeated in World War I. Baudens, in his *Souvenir of a Mission to the Army of the Orient: One can never entertain too high an opinion of the services which medical science can render to an army in the field, or of the influence which it can exert upon the vicissitudes of a war. Its counsels, not always asked nor even heeded, as long as the need is not cruelly felt through suffering and death, would save many men who are lost or injured through improvements which might be of use to the country. Diseases kill more men than powder and shot, yet it is easy to prevent them by the simplest hygienic precautions* (Ref. 6).

In spite of the warnings and advice of (Medical Inspector) Michel Levy (a member of the Academy of Medicine), cholera, frost bite, pulmonary and intestinal diseases, scurvy, and typhus raged with an intensity that caused an infinitely higher number of deaths than the fire of the enemy (Ref. 6).

Comparing the mortality of the British and French armies as in the first year, climatic influences and fatigue being equal and organization of supplies and sanitation different, one arrives at the following eloquent figures: The French army, with a mean effective strength of 130,000 men, had 21,191 deaths, of which 10,278 were due to typhus. The British army, with a mean effective strength of 50,000 men, had only 606 deaths of which but 16 were due to typhus. In like manner, at the time the peace was signed, there were 6,000 cases of scurvy in the French hospitals and not a single one in the British army (Ref. 6).

During the Crimean War, English opinion had shown itself more exacting and the effects of the autonomy then accorded to the Royal Army Medical Corps had been so favorable for all that this example might well have been followed in France (Ref. 6).

The war in Italy against Austria in 1859 was also bloody and revealed once again the insufficiencies of the medical corps in providing care to the wounded. There were not enough doctors; the expeditionary corps had fewer than one physician for 1,000 troops. Equipment proved to be inadequate and scarce. In fact, it was good and available in France but was not delivered in time to the medical corps. The evacuation system was chaotic. In June 1859, at the end of the Battle of Solferino, some 40,000 men (Austrians, Italians, French) remained on the battlefield, either killed or wounded, of the 300,000 who took part in the fighting. It took days before all survivors could be taken care of. Nearly seven decades later, Inspector General Sieur commented on the shortages of medical supplies and personnel at Solferino in his history: *During the carnage of Solferino, everything was lacking—surgeons, nurses, surgical instruments, dressing material, rations, and transportation* (Ref. 6).

The Solferino massacre and its aftermath had a neutral witness, the Swiss Henri Dunant. In 1862 he published *Souvenir de Solferino*, a book in which he described the horrors that the wounded endured. The impact of Dunant's report was such that in 1864 the first

Convention was signed in Geneva, and the Red Cross was born. Dunant received a well-deserved Nobel prize in 1901 for this accomplishment, and the Red Cross supplemented the inadequate national military medical services.

The Red Cross' "raison d'être" was tested in the field in 1870, when war between France and Prussia was declared (the Franco–Prussian War, 1870–1871) (**Fig. 27**). On the French side, the lessons of the two preceding wars had no impact on the reorganization of the medical corps, which rapidly proved to be as disorganized and impotent as it had been in Solferino. Of approximately 900,000 men who participated in the fighting, 170,000 died. During this 2-year war, 470,000 men were hospitalized: 130,000 for injury and 340,000 for sickness (**Ref. 2**). Even Napoléon's 1805 policy of vaccinating French soldiers against smallpox may have been allowed to lapse, for during the Franco–Prussian War, many more French soldiers than German contracted smallpox.

Anesthesia first came into common use in the treatment of war casualties during the Crimean War. Ether had been used successfully for the first time on 16 October 1846 by Morton in Boston, Massachusetts, and chloroform was used a year later in Edinburgh, Scotland, by Simpson; both were available during the Crimean War (**Fig. 28**), but chloroform was the selected agent on the French side. During the following conflicts, anesthesia became routine and slowly chloroform prevailed. By 1870, general anesthesia was widely used, as was morphine. Chenu regretted that syringes and morphine had not been available in each of the battalion infirmaries during the Franco–Prussian War.

Although the studies of Pasteur and Lister were known to military surgeons, their impact in dealing with war wounds remained limited. The Lister technique of spraying phenolic acid in the operating room was difficult to use and consequently was not accepted. It took another 10 years before antisepsis prevailed in operating rooms, either civilian or military.

Sedillot, a military surgeon, advocated that dressings be boiled before being applied to wounds. In 1870 most war surgeons used various antiseptics when cleaning wounds, but antiseptic wound cleansing did not replace wound débridement. Débridement remained standard, as it had been during the Algerian War of Conquest, and as Baudens (see next section) had advocated 40 years before.

Isolation of patients with sepsis, disinfection of contaminated ambulances, and closing of contaminated hospital rooms became standard as a result of Pasteur's work. The term microbe, coined by Sedillot, became prevalent in the French medical literature as a more precise synonym for germ. Immobilization of soft-tissue wounds, similar to fracture immobilization, was advocated by military surgeons and largely used during the Franco–Prussian War.

The most prominent figures of the medical corps between 1815 and 1871 were Lucien Jean Baptiste Baudens and Felix Hippolyte Larrey.

LUCIEN JEAN BAPTISTE BAUDENS

Lucien Jean Baptiste Baudens (**Fig. 29**) was born in 1804. In 1829, as a 25-year-old medical student at Val-de-Grâce Hospital, he did a pioneering experimental study on colonic bowel anastomosis. He opened the abdomens of 12 dogs, created bowel injuries, and repaired them using the inverting stitches that had been recently described by Lembert, (**Ref. 23**) a young resident of Hotel Dieu, a nearby Paris hospital. Most of the dogs survived. Baudens published the results of this study in his thesis before he graduated as a medical doctor. He concluded his work by saying: *"I would not hesitate to use the same procedure on a wounded soldier, if circumstances allowed it."* (**Ref. 24**).

In 1830, he was assigned to the expeditionary corps sent to Algeria (**Fig. 30**). In 1832, two soldiers were brought to him (separately) with abdominal bullet wounds (**Fig. 31**). The first patient underwent a colonic repair and died a few days later. Baudens performed an autopsy and discovered an intact suture, but found a second perforation in the cecum that had been missed during the operation. Encouraged by this finding, he operated on the second soldier, who recovered uneventfully. In his operative report Baudens noted that the second operation took place only 30 minutes after the injury, and he assessed that the success had been influenced by the short lag time before surgery (**Ref. 24**). This achievement was not duplicated for 50 years; it was only with general anesthesia and aseptic techniques that surgeons again attempted to repair colon injuries.

Baudens modernized amputation procedures to facilitate healing and early rehabilitation, and was the first to do a successful hip disarticulation. He accepted only selective débridement, but refused to inflict it when tissue damage was minimum. He was not only a skillful surgeon, he was also a talented teacher. He taught in a hospital in Algiers, which, thanks to him, became part of a medical school—the first institution of this type on the African continent. In 1836, Baudens published in Paris a remarkable book entitled *Clinical Aspects of Fire-Arms Wounds*, (**Ref. 25**) one still worth reading today. He has been called, with reason, "the new Larrey".

FELIX HIPPOLYTE LARREY

Felix Hippolyte Larrey (1808–1895), the son of the great Dominique Larrey, followed the steps of his father as a military surgeon. He became a professor at Val-de-Grâce Military Hospital as well as a professor at the civilian Paris Medical School. His military career took him to Algeria; father and son were both in Algeria when Dominique became sick. They returned to France, where Dominique died in Lyon in the arms of his son.

Hippolyte became the chief surgeon of the Imperial Army at Solferino. During the war with Prussia, he served in the east of France and then in Paris. During these two campaigns, he was outraged by the lack of efficiency of the military administration in providing the means of treatment and evacuation needed by the medical corps. He became one of the most vocal proponents of the autonomy of the medical corps.

FROM THE DEFEAT OF 1871 TO THE ONSET OF WORLD WAR I

The primary source for this section is volume 2 of the *History of military medicine in France*, edited under the supervision of the Comité d'Histoire du Service de Santé (Committee for the History of the French Military Medical Corps) (Ref. 2).

After the defeat of 1871 and the loss of Alsace-Lorraine (which was never accepted by its people), France was at peace with her European neighbors for more than 40 years. Revenge against Germany was temporarily and realistically set aside, and the country looked overseas for expansion. This period coincided with France's colonial expansion and the scientific and industrial revolutions. Although the effect of the industrial revolution on the medical services was profound (eg, flying ambulances were replaced by sanitary trains in 1880 and then by automobiles between 1902 and 1910), the effect of colonial conquest was more dramatic.

The control of North Africa took more than 30 years. Pacification of Algeria was more difficult than expected in 1831, when the first troops landed. A new campaign took place in 1853, and until the end of the century, several episodes of rebellion had to be repressed. Tunisia was defeated and became a protectorate in 1881. It took 10 years of war (1904–1914) before Morocco accepted the same status. In the meantime, the Sahara Desert south of the Maghreb fell under total control of the French forces. The conquest of the western part of "black Africa", as it was called then, started in 1879, adding successively Senegal, Gabon, Sudan, Dahomey, Niger, Mali, Togo, and Congo to the colonial Empire. The vast island of Madagascar was occupied in 1895.

In the Far East, Indochina was conquered between 1883 and 1885. To secure that conquest, an expedition was organized against China in 1900–1901. During this time, the great scientists Pasteur, Lister, Koch, and other pioneers laid the foundations for modern medicine and surgery. The last 20 years of the 19th century were the golden years of the development of surgery. With the combination of anesthesia (1846) and asepsis (1880), most of the operations that we know today were at least attempted. This was also the time when germ identification changed the medical approach to contagious diseases and led to vaccination protocols.

As a consequence of colonial conquests, the military medical establishment had to support troops fighting overseas and then had the duty of providing medical care to the local populations. Both tasks were initially devoted to navy doctors. In January 1890 a civilian colonial medical corps was created by law to fulfill that second mission. This corps was initially manned by navy personnel.

Ten years later, in January 1900, the Medical Corps of the Colonial Troops was created. Its mission was to support the troops serving in the colonies. Some of its personnel subse-

quently served for extended periods in the civilian Colonial Medical Corps, providing care to the local populations. The extraordinary medical opportunities related to this double mission attracted several generations of bright young military doctors. Some of them became world famous. For example, Laveran, professor at Val-de-Grâce, became the first French medical Nobel laureate in 1907 for his work on malaria.

Since 1900, the military health department has had three separate administrative components: the Army Medical Corps, the Navy Medical Corps, and the Medical Corps of Colonial Troops. At a time when military medicine was opening a new chapter overseas, the Army Medical Corps in France had to adapt to modern technology and improve its performance to be prepared if a new war with Germany should break out.

The autonomy of the Army Medical Corps, which had been unsuccessfully proposed by Larrey and Percy, was finally achieved by law on 16 March 1882. The corps was now run by a surgeon general, who, in the line of command, reported directly to the chief of staff. This was a major step in the improvement of the system for providing medical care in the military. Eight years later, on 31 March 1890, a similar law was adopted for the Navy Medical Corps.

On 9 March 1889, a new army military medical school was opened in Lyon to replace the Strasbourg school now in German hands. On 10 April 1890 a similar school was opened in Bordeaux for the navy (and later for the Colonial Medical Corps). For cadets in Lyon and Bordeaux, standard medical teaching was (and is still today) provided by the staff of local civilian medical schools. The additional medical military program was taught at Val-de-Grâce for army doctors (Ecole d'Application du Service de Sante de l'Armee de Terre) and in Toulon for navy doctors (Ecole d'Application du Service de Sante de la Marine). The school in Toulon was opened in 1896.

During that period, the military medical establishment, through its three separate medical corps, had three obligations:

1. to be ready for a new confrontation with Germany;
2. to provide care to troops in France (**Fig. 32**), at sea on ships, and overseas (**Fig. 33**); and
3. to develop a public healthcare system in an immense empire, which spread from Indochina, to the equator in Africa, and to Guyana in South America.

In 1910, the first modern comprehensive plan with various echelons of medical care was developed to fulfill the needs generated by a potential global war with Germany. Modernization of the equipment was undertaken. In addition, Pasteur Institutes, hospitals, and medical schools were opened in several colonies (**Fig. 34**). In 1890, Albert Calmette (1863–1933), a navy doctor, opened a Pasteur Institute in Saigon. He invented a new technique for delivering Jennerian vaccine, which allowed for mass vaccination; the entire population was immunized and smallpox disappeared in the following 10 years. Calmette and Guérin later developed the bacille bilié de Calmette-Guérin (BCG) vaccine, the only one available against tuberculosis. In December 1896 a medical school was opened in

Tananarive, Madagascar, run by doctors of the Colonial Medical Corps. In 1902, the school's first 10 Malgache (ie, a person from Madagascar) students became qualified physicians.

Serving in the Colonial Medical Corps was an exciting challenge for young military doctors. The risks were great, mainly related to epidemic diseases; many died of yellow fever and malaria. Volunteers were numerous, nevertheless, and generally among the best of their generations. Several of them ended their careers as the most prominent medical personalities of their time. The names of Calmette, Delorme, Laveran, Villemin, Yersin, and others are still remembered today, not because of their prestige in the military establishment but because of their contributions to modern medicine and surgery.

EDMOND DELORME

Edmond Delorme (1847–1929) entered the Strasbourg Military Medical School in 1856. In 1870 as a medical student, he had his first contact with war surgery during the Sedan disaster (this French city was the scene of the decisive battle of the Franco–Prussian War in 1870, which resulted in the defeat of France and the surrender of Emperor Napoléon III). In 1877, Delorme became professor of surgery at Val-de-Grâce hospital. At that time, this prestigious hospital has no dedicated operating rooms. Operations were done at the bedside in wards, or in an amphitheater, which was used by all types of specialists. Delorme requested and obtained the exclusive use of this amphitheater for surgery, and in this first Val-de-Grâce operating room, he proved to be a pioneer in thoracic surgery. In 1892, he described a thoracic approach for a pleural decortication (**Fig. 35**). This same approach was used in 1901 by Fontan, a navy doctor from Toulon, who achieved the first successful repair of a cardiac wound in France. In 1902, Delorme described a technique for the treatment of prolapsed rectum, a procedure that is still practiced today. For 14 years, he studied gunshot injuries on cadavers. Based on his research, in 1888 and 1898 he published two editions of his *Manual of War Surgery*.

CHARLES LOUIS ALPHONSE LAVERAN

Charles Louis Alphonse Laveran (1845–1922) (**Fig. 36**) was a 1866 graduate from the Strasbourg Military Medical School. During the conflict with Prussia in 1870–1871, he served in various ambulances in the war zone. In 1874, he was appointed professor of epidemiology at Val-de-Grâce Military Medical School. In 1878, he was sent to Constantine, Algeria, where he had to face several types of fever of epidemic proportion. One was called pernicious fever (ie, falciparum malaria) because of its lethality. Laveran did numerous autopsies on soldiers who died from it. In November 1880, he discovered parasites in the blood of a cavalier suffering from pernicious fever. Laveran clearly saw their flagella moving under his microscope and concluded that they were alive. He called them hematozoaires and concluded that these parasites were responsible for the disease. He raised the hypothesis that the parasite was transmitted by mosquito bites; this was

later confirmed by Ronald Ross, a British physician working in India. In 1884, Laveran published a book on paludal fever (ie, malaria). After his retirement from the medical corps in 1897, he continued his research at the Lille Pasteur Institute. In 1907, he became the first French scientist to receive a Nobel prize in the category of physiology and medicine for his work on malaria.

JEAN ANTOINE VILLEMIN

As professor at Val-de-Grâce, Jean Antoine Villemin (1827–1892) (**Fig. 37**) did clinical and animal research on tuberculosis. In 1865 he demonstrated that the causative agent could be transmitted from patient to animal by inoculation. When he presented the results of his first study at the prestigious Academie de Medecine he was not taken seriously until 1882, when the German Robert Koch identified the agent that now bears his name, Koch's bacillus (now called *Mycobacterium tuberculosis*).

ALEXANDER YERSIN

Born in Switzerland in a family of French Huguenot descent, Alexander Yersin (1863–1943) (**Fig. 38**) joined the Colonial Medical Corps in 1892. Most of his career was spent in Indochina. In 1894, he was sent to Hong Kong to study an epidemic of plague, which had already claimed several hundred lives. The authorities refused him the right to do autopsies, which was reserved to Japanese scientists. A few bribes allowed him to get some fresh cadavers from which he collected samples of blood and buboes. Working in a poor, isolated, improvised laboratory, he identified and cultivated the responsible bacterium, now called *Yersinia pestis*, and then injected it to guinea pigs, confirming Koch's postulates.

Yersin presented the results of his study to the Academy of Sciences of Paris in July 1894. Afterwards he stayed in France to prepare a serum to fight the disease, now known to be caused by the newly named *Yersinia*. He then returned to Indochina where he opened a new Pasteur Institute in Nha Trang, Vietnam. In 1897, Paul Simond, also a member of the Colonial Medical Corps, discovered *Yersinia* in fleas and proved that fleas are the vector of plague between rats and humans. That discovery opened the door to prophylaxis.

WORLD WAR I: 1914 - 1918

The primary source of information for this section of the chapter is volume 3 of the three-volume *History of military medicine in France* edited under the supervision of the Comité d'Histoire du Service de Santé (Committee for the History of the French Military Medical Corps) (Ref. 3).

World War I erupted on 2 August 1914 and ended 4 years later, on 11 November 1918. The war rapidly became a global conflict, with armies of a magnitude never reached before. It was also the first war of the modern industrial era. Not only were automatic weapons and modern artillery available for this war, but the first armored vehicles and tanks became part of the armamentarium. Aviation opened new ways of fighting. Chemical warfare with toxic gases started a horrifying chapter in the history of war, and brought new challenges for the medical corps. French forces were engaged on national soil; they were also fighting in Italy, an expeditionary corps was sent to Turkey (in 1915–1916), and another one to the Balkans (in 1916–1918).

At the start of the war, German troops invaded the northern part of France through Belgium. For a few months, front lines moved rapidly back and forth. The same phenomenon occurred again during the last 3 months preceding the 1918 armistice. Except for these two periods, front lines were stable, with very few movements of troops. A war of attrition took place in and over trenches. Problems facing the medical corps were different during these three different phases of the conflict.

At the beginning of the war, 10,490 physicians (1,445 active duty, 8,995 reserves) served in the medical corps (Fig. 39). A year later, the total had reached 15,363. In 1914, the military medical corps had 235,000 hospital beds under its control. This number later increased when civilian hospitals were added, mostly those managed by the French National Red Cross (Fig. 40).

STRATEGY OF THE MEDICAL CORPS

Out of the trenches, the first problem was to localize and retrieve the wounded. That was the task of medics (Fig. 41). The risk was so great for them that in Verdun they were not allowed to leave the trenches during daytime. They explored battlefields at night, without lights, guided only by the laments of survivors. Dogs were soon trained to identify and localize those survivors, and then to guide medics to them.

In 1914, taking into account the availability of the new means of transportation, the initial doctrine of the medical corps was to evacuate a maximum number of casualties as far as possible from the front line. The plan was to dispatch them directly to hospitals of the rear by motor ambulances and sanitary trains (Fig. 42). Thousands of wounded ended their ordeals in towns like Bordeaux or Nice, several hundred miles away, after trips lasting 24 hours or more (Fig. 43). The results were disastrous.

In 1915, when the front line was stabilized, two first echelons of care were developed. First aid stations were positioned 1 mile behind the most advanced trenches, and mobile or stable surgical ambulances were placed a few miles away from the front line. These ambulances, which were in fact small hospitals, became the first echelon of surgical care.

During the first 8 days of the Verdun Battle, between 11 February and 19 February 1917, the three local frontline ambulances received 19,775 casualties (Ref. 3). The system was dramatically overwhelmed by 2,500 or more casualties daily. Subsequently, special units devoted to triage were created in 1917, which were interposed between first aid stations and first surgical facilities. At Verdun they were positioned next to first aid stations. It had been estimated that those units could triage 1,000 wounded a day. And, in fact, from 31 May to 7 June 1918 at Royallieu, 7,631 casualties were examined and categorized in such a unit (Ref. 3).

SURGICAL WAR PATHOLOGY

During the trenches periods of the war, wounds from fragments (60%) predominated over those from bullets (16%). Bullet wounds went up to 30% during the mobile phase at the end of the war (Figure 4-44). The type, location, and percentage of injuries sustained by the French Army in the Argonne Battle of 1917 were classified as follows:

- upper limbs, 36%;
- lower limbs, 26%;
- head, 20%;
- thorax, 11%; and
- abdomen, 6%.

At the beginning of the war, wounded soldiers had to suffer not only from the wrong organization of primary care delivery but also from the inexperience of surgeons facing war pathology. “*We knew nothing about war surgery,*” (Ref. 3) wrote Lejars, a renowned surgeon of the time. The following quotation from Abram, written after the war, summarizes well the progress during the war years:

In 1914 a soldier with a fragment knee injury would probably have died from septic gangrene in Bordeaux or Nice (because of systematic evacuation to the rear); in 1915 he would have survived, as an amputee, after a thigh amputation made in the front-line surgical ambulance; in 1916 a partial resection of his knee would have saved his life and leg, but he would have lost his knee mobility; in 1918 he would have survived, with his lower limb intact and with most of his knee mobility (Ref. 3).

In 1914, the official doctrine concerning abdominal wounds was “no operation.” This policy was adopted by the French medical corps because of the bad experience of the British during the Boer War, 12 years earlier. No one in the West was aware of the positive expe-

rience of Princess Gedroitz, a Russian surgeon in 1904–1905 during the conflict with Japan (Ref. 24, 26). Obviously surgical abstention combined with the long-distance evacuation policy was a death sentence for almost all abdominal wounds. Only in 1915 were these wounded operated on relatively early, in frontline surgical ambulances.

During the 4 years of the war, about 120,000 cases of trench foot were reported. Of these, 15% had to be evacuated to the rear and 0.5% underwent amputation.

NONSURGICAL WAR PATHOLOGY

During the conflict the medical corps had to fight severe epidemics. In France, 12,135 soldiers contracted typhoid fever; 11,403 of them died before vaccination became systematic. Later, 194,923 cases of "Spanish flu" were reported, and 11,981 of those infected died. Cholera was endemic in Macedonia before vaccination against it was applied to troops prior to their assignment there. In the Balkans, malaria was another major problem. In 2 years, 91,000 cases were recorded at the hospital level.

The La Haye International Agreement, prohibiting the use of noxious gas in warfare, had been signed on 29 July 1899. Despite that agreement a surprise gas attack was launched by the Germans against a French division on 22 April 1915, which at first was thought to have caused 5,000 deaths (this figure was later revised downward). The first chemical agent used was chlorine gas and 168 tons of it were sent into the air by the Germans during the first day of the attack (Fig. 45). After that, several others agents were used, including mustard gas, which was called yperite because the town of Ypres, Belgium, was the location of its first use. The medical corps had to cope with the victims and at the same time had to develop means of protection (Fig. 46). It took a month before a simple mask of cotton could be distributed to all troops after the first attack.

CASUALTIES

In terms of deaths and injuries, the price paid by France for victory was enormous. Out of a population of 38 million, 7,800,000 soldiers were drafted and by the end of the war 1,390,000 of them had died. The total number of wounded is not known, but 740,000 who survived injury were considered *grands mutilés* (highly handicapped). A high percentage of them were amputees or had spectacular facial injuries. The latter were called *gueules cassées* (broken faces) by the public. Reconstructive facial surgery underwent a major development during and after the war.

The loss of lives among the personnel of the medical corps, proportional to its size, was second only to the infantry. Over 10,000 physicians, pharmacists, medical students, administrative officers, nurses, technicians, and medics were killed in action.

FROM THE END OF WORLD WAR I TO THE END OF THE COLONIAL WARS : 1918 - 1962

The primary source of information for this section of the chapter is volume 3 of the three-volume history of military medicine in France edited under the supervision of the Comité d'Histoire du Service de Santé (Committee for the History of the French Military Medical Corps) (**Ref. 3**).

From the end of World War I in 1918 to the end of the last colonial war in 1962, the medical corps (**Fig. 47**) was involved in three major conflicts: World War II, and the colonial wars in Indochina and in Algeria. At the same time, it underwent numerous transformations. During this period, military physicians received France's highest award, the Legion of Honor, not only for their courage in providing combat casualty care in the face of the enemy but also, albeit more rarely, for their actions as combatants against the enemy (**Exhibit 4**).

WORLD WAR II (1939 - 1945)

On 21 September 1939, France and Great Britain declared war against Nazi Germany. Only 20 years had passed since the Versailles treaty ended World War I. The German army invaded France in June 1940. The fortifications of the Maginot Line were well equipped with underground hospital beds and surgical facilities. Unfortunately they turned out to be of no use, since the invasion took place north and west of the Maginot Line.

This campaign was characterized by the German use of armored divisions and aviation, following the blitzkrieg concept. The doctrine of the medical corps, still based on the experience of World War I, was characterized by immobile entrenched armies. Despite adequate personnel, material equipment, and hospital beds, the medical corps was not ready to cope with the needs of a rapidly moving front. The lack of motor ambulance evacuation was especially obvious.

The June 1940 defeat resulted in 2 million prisoners of war being taken into Germany. Most physicians remained voluntarily with their troops. Despite their rank as officers, most stayed in stalags (camps for enlisted men), where they provided medical care during the first months of detention. In October 1940, German authorities set free drafted physicians and kept only those in the regular army. In 1942 volunteer (and nonvolunteer) military physicians or medical students from the Lyon and Bordeaux military medical schools were sent to Germany to replace those who had already spent 2 years in captivity.

In 1942, General De Gaulle's Free French Forces reentered into the war on the allied side. They participated in the campaign of Italy, and then the landings in Normandy and Provence, and finally the battles of Alsace and Germany. These troops as well as their new medical corps (**Fig. 48**) were largely equipped with American matériel.

After the cease-fire in May 1945, France had to repatriate more than 2 million people from German camps: war prisoners, detainees of concentration camps, forced laborers, and forced draftees from Alsace. A corps of 2,320 doctors, 108 pharmacists, and 78 dentists participated in this endeavor. During World War II, France lost half a million people, men and women of all ages, both military and civilian. This was a contrast with World War I, during which the majority of victims were young male soldiers.

THE INDOCHINESE WAR (1945 - 1954)

In 1945, after Japan's defeat, France sent an expeditionary corps into the Indochinese Peninsula. Its colonial authority was contested there by Ho Chi Minh, a communist leader, who had proclaimed the independence of the Democratic Republic of Vietnam on 2 September 1945. The Indochinese War lasted 9 years (1945–1954). The number of troops involved increased during that interval from 63,000 to 190,000. The war ended when the 11,000 soldiers encircled in Dien Bien Phu surrendered. During the course of the Indochinese War, casualties on the French side totaled 23,400 killed; 9,900 missing in action; 45,246 wounded; and 39,888 captured. Of the prisoners, 29,954 (75%) did not return from captivity (**Fig. 49**) (**Ref. 3**).

During this war, the medical corps activity was marked by two innovations: the use of helicopters for primary evacuation, and the development of an "antenne chirurgicale parachutiste" (parachutable surgical unit) (**Ref. 27–28**). The helicopter proved to be the ideal mode of evacuation for victims of guerrilla warfare in remote locations. It became popular primarily because one of the first pilots was a woman doctor, Captain Valerie Andre. She soon became famous among troops in Indochina as well as in France (**Fig. 50**).

The concept of a parachutable surgical unit came out of the need for a light, rapidly deployable surgical facility to provide the first vital surgical care, anywhere in the country, to victims of ambushes. It was developed as a complement to the already existing "antenne chirurgicale mobile" (mobile surgical unit), which had the same goal but was slightly heavier and only transportable by road. The Dien Bien Phu forces were initially supported by two surgical units. During the first 4 months they treated 612 casualties. During the final attack, which started on 12 March 1954, they were rapidly overwhelmed. Three more surgical units were parachuted into the encircled base and managed—despite the permanent shelling—to land, settle, and start operating. In the following 3 weeks that preceded the surrender, of 2,156 wounded, 1,154 casualties were operated on, among them 140 with abdominal wounds, 104 with thoracic, and 100 with vascular (**Fig. 51**).

The history of Dien Bien Phu emphasized the incredible courage of the individuals who manned these surgical units, particularly of those who were dropped during the final onslaught. But it also validated the concept itself, showing the efficacy of a light, air-transportable surgical structure. In Indochina, 52 officers of the medical corps, including

30 doctors, were killed in action; another 125 died from either diseases or wounds; 166 suffered serious injuries; and 44 were missing in action.

THE ALGERIAN WAR (1955 - 1962)

The Algerian War, France's last colonial war, started 1 year after the defeat at Dien Bien Phu and lasted 7 years (1955–1962). The number of troops involved rapidly reached 400,000 and remained at that level until the cease-fire in 1962. Compared with the volume of troops, the number of those killed in action on the French side was small: 10,000, among them 16 military doctors. Hepatitis of epidemic proportions (30,000 cases) was one of the major health problems for the medical corps.

Three points deserve to be emphasized in summarizing the care of the wounded during the Algerian War:

1. Primary evacuation by air, mainly helicopter, became routine.
2. The parachutable surgical unit proved again to be a valid concept.
3. Primary resuscitation during air transport became routine.

In the beginning, no resuscitation was provided during air transport, especially when evacuations were asked for by platoon officers, bypassing the medical corps. Too many evacuees died before reaching the hospital facility. To improve that situation, young drafted doctors were trained to provide primary resuscitation (reanimation) during evacuation (Fig. 52). The system proved to be so efficient that some of these reanimators, on returning to civilian life, initiated similar emergency service in France. It is now called Service d'ambulance mobile universitaire (SAMU) in large cities and Service medical d'urgences regionales (SMUR) in and around small towns. Sending doctors with means of resuscitation to the scene of any emergency has been the standard of emergency care in France since the end of the Algerian War.

REORGANIZATION OF THE MEDICAL CORPS AFTER 1945

In 1945, three separate entities existed: the Army Medical Corps, the Navy Medical Corps, and the Colonial Medical Corps. In 1947, a fourth entity, the Air Force Medical Corps, was officially created. In 1948 the four corps were unified at the top, under the umbrella of a common surgeon general. It took 20 more years (until 1968) to see, at the highest level of command, a real fusion between the four corps. Since 1968, military hospitals have been run by specialists, regardless of their service.

In the meantime, with the independence of the former colonies, the colonial corps has returned to its earlier name: Medical Corps of the Marine Troops. This corps, in addition to its military missions, continues to send some of its physicians overseas, especially to Africa on request from local governments.

THE MEDICAL CORPS AT THE END OF THE 20TH CENTURY

There are currently about 3,000 active duty physicians in the medical corps. In addition, there has been an annual draft of medical personnel, which dates back to the French revolutionary wars in 1792. In addition about 10,000 young physicians, as well as thousands of nurses and support personnel, were drafted annually to serve for 10 months. The reform of 1996 has reduced the size of the armed forces and ended the draft in 2001.

The medical corps now faces what is known as the "professionalization" of the armed forces, as well as of the medical corps itself. This reform means that the corps has to rely solely on regular personnel. More than ever its teaching programs is of the utmost importance. They are delivered at four different levels:

1. Two military medical schools in Lyon (**Fig. 53**) and Bordeaux for young medical students.
2. The Val-de-Grâce Military Medical Corps School in Paris (École d'application du service de Santé des Armées), where all active-duty medical students learn the basics of military medicine during their last year of medical studies (**Fig. 54**).
3. Specialized courses for each service (army, navy, air force), as well as tropical medicine for those who will serve overseas.
4. Military teaching hospitals, which provide various residency programs.

LYON MILITARY MEDICAL SCHOOL

The Imperial School for the Military Medical Corps (Ecole Imperiale du Service de Santé Militaire) was created in 1856 in Strasbourg. This school fell into German hands in 1871. In 1888 a similar new military medical school opened in the center of Lyon. In 1914 the 558 students of this school were sent to the front. By the end of the war, 133 of them had been killed. The school was transformed into a hospital and remained so until the end of World War I.

During World War II, the school was occupied by the Germans and served as the Gestapo headquarters under the command of Klaus Barbie, the "*butcher of Lyon*". (In 1987, Barbie was convicted in Lyon of crimes against humanity and received the maximum sentence under French law, life in prison.) Several heroes of the French resistance, particularly Jean Moulin, were imprisoned and died there. Parts of the buildings were bombarded and destroyed at the end of the war. In 1951, when the author of this chapter entered Lyon Military Medical School, moving messages left by prisoners could still be read on the basement walls.

In 1952, the school accepted its first female medical students. Since 1973 a large contingent of women is recruited every year. When the old Lyon school closed in 1981, it had produced approximately 11,000 military physicians. The new school is located on a large campus in the outskirts of Lyon. It provides board and lodging to medical students and has

superb auditoriums and sport facilities. It prepares recruits to become commissioned officers as well as military physicians.

The “Santards” (students) receive their medical education with their civilian counterparts at the Lyon civilian medical schools. As a final step before graduating as a medical doctor, all students must write a thesis. Most are modest, some are remarkable; all are kept in the school’s archives. Among them, printed at the school in 1897, is the thesis of a Santard named Ernest Duchene. After conducting experimental research, he wrote a thesis entitled *Contribution à l’étude de la concurrence vitale chez les micro-organismes* (*Contribution to the study of vital competition among microorganisms*). In it, he described the effects of a culture of *Penicillium* on adjacent cultures of *Escherichia coli* and the typhoid bacillus, *Salmonella*, 30 years before Fleming’s first work on that topic. This thesis can be seen (and read) at the Val-de-Grâce museum today.

BORDEAUX MILITARY MEDICAL SCHOOL

The Bordeaux school opened in 1880. Initially, it recruited only future navy doctors. At the turn of the century, it also took in charge the future colonial physicians. Until 1971, the Bordeaux school accepted only navy and colonial recruits, and the Lyon school, only army and air force. Since 1971 the two schools take all medical students, regardless of the corps in which they will serve later. The young doctors choose where they will serve when they graduate.

In 1981, when the vast and modern new Lyon school opened, its counterpart from Bordeaux was supposed to close, ending a century of rivalry. This has not been the case, and now 60% of students go to Lyon and 40% to Bordeaux. Since 1950, the two schools have been open to military students from foreign countries, the majority from former French colonies.

PARIS VAL-DE-GRÂCE MILITARY MEDICAL CORPS SCHOOL

The Val-de-Grâce was a magnificent convent largely developed around 1650 by Anne of Austria (Anne d’Autriche), the mother of King Louis XIV. In 1793, during the revolution, it was turned into a military hospital. In 1796 it became a teaching institution under the direction of Coste, who had served previously in America as surgeon in chief of Rochambeau’s army. In 1850, it became what it remains today, the Military Medical Corps School (École d’application du service de Santé des Armées). This school symbolizes military medicine in France.

In 1978, a new, modern, 400-bed hospital opened at the back of the compound. The restoration of the convent was carried out from 1978 to the present time. It is now completed. The Military Medical Corps School as well as the library and the museum are located in the historic part (**Exhibit 5**).

The school comprises 14 departments: Military Medicine (Médecine d'Armée), Hygiene, Ecology-Ergonomics, Epidemiology and Prophylaxis, Psychiatry, War Surgery, Surgery for War Sequellae, Specialty Surgery, Anesthesia-Intensive Care, Radiology, Radiobiology and Nuclear Protection, Chemistry, Toxicology, and Military Forensic Expertise. All military medical students from the three schools—Lyon, Bordeaux, and Val-de-Grâce—attend classes in these departments at Val-de-Grâce during the final 18 months before they graduate.

During that pregraduation period, complementary training is provided by service:

- navy students go to Toulon Naval Hospital (Ecole d'application du Service de Sante pour la Marine, open since 1725);
- air force students attend the School of the Air Force Medical Corps in Paris (Ecole d'application du Service de Sante pour l'Armee de l'Air, since 1975); and
- future overseas doctors are sent to the Tropical Institute of Marseilles, called Pharo (inaugurated in 1907).

MILITARY HOSPITALS

With the downsizing of the armed forces, the number of military hospitals has been reduced. The three modern Parisian military teaching hospitals—Val-de-Grâce, Percy, and Begin—are among the nine remaining open. These hospitals cover all specialties except cardiac surgery. They have residency programs in most of these specialties. A young graduate medical doctor must spend 2 or 3 years as a physician in a military base, in France or overseas, before applying for one of these programs. To have access into one of these programs the candidate must pass a competitive examination (called concours, which are prepared in teaching hospitals), with more candidates than positions. At the end of all residency programs, qualification requires a final examination, which is not the case in civilian practice.

In surgery, residency training lasts 5 years. Urologic, orthopedic, thoracic, vascular, and gastrointestinal surgeons all get two or three semesters in general and emergency surgery, in either military or civilian hospitals. All residents spend a minimum of 1 year in civilian hospitals.

One of the main problems for military teaching hospitals in peacetime is maintaining a volume of patients sufficient to (a) maintain the level of skills of attending physicians and (b) develop it among residents (called assistants). In 1962 (after the Algerian War of Independence ended) military hospitals were opened to civilian patients. In 1997, 60% of all patients treated in the three Parisian military hospitals were civilian. It was expected that the percentage would increase to 80% by the year 2000.

The advantages of admitting civilian patients to military teaching hospitals are 2-fold:

1. The medical personnel are kept busy and satisfied, the level of skills is kept high, and the hospital's teaching mission can be accomplished.

2. The cost for maintaining these hospitals in case of military need is tremendously reduced for the Ministère de la Défense (Department of Defense), since civilian patients or their national public insurance system, called Social Security, or their private insurance, or both, pay for the cost.

CONCLUSIONS

Over the last 16 centuries, since the fall of the Roman Empire and the birth of France, an extremely large number of men have devoted their lives to the care of soldiers wounded on battlefields. They did it to the best of their ability, with the resources of their time. Only a handful of them left a trace in history. We mentioned some of the most famous: Pare, Percy, Desgenettes, Larrey, Baudens, Yersin, Laveran, Delorme, and Calmette. Several others who reached national or international reputation could also have been noted for their accomplishments. But thousands remained anonymous because they lost their lives, during battles or while fighting epidemics. They died too young to prove their technical or scientific ability. This is the feeling that visitors can get when they walk through the center of the old Val-de-Grâce. On black marble plaques, one or more for each war, they can read the names of all the members of the medical corps who died in wars since the French Revolution. Such a visit shows that the toll for the corps during the last 2 centuries has been enormous.

The preservation of the health or lives of soldiers at war is influenced by two main factors: the quality of the individuals in charge of that task (the human factor) and the quality of the structure in which they serve (the organizational factor). In that regard, the lesson of history is clear: the quality of the individual care providers is less important than the quality and type of the medical corps (if any) in which they work.

In the early 1500s, troops had no organized medical support. Ambroise Paré was the personal physician of King François I. Paré also took care of wounded soldiers, but that was not his primary mission. At the turn of that century, King Henri IV created temporary war hospitals for fighting troops (houses for the wounded), but there was no medical corps in charge of running these hospitals. Medical personnel were still recruited by and devoted to individual generals, who drafted and paid their own troops. A century later, in the early 1700s, Louis XIV created the first medical corps for the army. But its personnel were not considered to be military officers. They were recruited on temporary commissions for the duration of a conflict and had no independent means of action. That situation had not changed a century later, during the bloody revolutionary and Napoléonic Wars. During that 23-year period, military physicians (headed by Pierre François Percy) complained that they did not have the material resources for fulfilling their mission: there were insufficient means of transportation and hospitalization; a lack of bandages and medicines; and often a lack of food, water, clothes, and cover for the wounded. Several times Dominique Larrey as well as Percy reported directly to Napoléon when the service called the intendance, in charge of providing the necessary material resources, was not doing so, but to no avail.

The reality was that for the intendance, the priority was to fulfill the needs of fighting troops, not those of the wounded. Fortunately and despite the lack of support, as General Sieur wrote in 1929, *"yet the medical service was never lacking in able men."*⁴(p851) But the ability of individuals could not compensate for the lack of organization and resources.

In 1834, military physicians finally were recognized as officers. This new status was a real step forward. For the first time physicians with the rank of general became, in the hierarchy, the equal of generals of the line. But it did not change their ability to get resources according to the necessity of their missions. The successive medical disasters of the Crimean, Austrian, and Franco–Prussian campaigns showed again that the intendance, interposed between the High Command and the medical corps, did not respond to the need of the medical corps.

In 1882, finally, the French Army Medical Corps became an autonomous service (the equal of the service of intendance), with a surgeon general reporting directly to the chief of staff. From now on the medical corps could evaluate its needs in personnel, material, and equipment, and ask for an adequate budget. According to its budget, the corps was now totally responsible for its policy and fulfillment.

Today, at the end of the 20th century, the medical corps faces a new challenge, this one caused by the end of compulsory military service. In a strictly financial sense, professional armed forces, including a totally professional medical corps, are more expensive to maintain than a military based on the draft. The global reduction of the armed forces will necessitate a downsizing of the medical corps, which will certainly then face a shortage of personnel, medical care providers as well as support personnel during a future war. Costly recruitment will surely then follow. However, on the positive side, in terms of the budget, military hospitals are open to civilian patients and will remain so. The financial contributions from civilian patients will help to maintain these military hospitals and keep them open and active, ready to fulfill their missions in case of war. It would have been disastrous to be forced, for budgetary reasons, to close most of our military hospitals—as happened in neighboring countries.

LANDMARKS IN THE DEVELOPMENT AND PROGRESS OF FRENCH MILITARY MEDECINE AND SURGERY

1545 ■ Publication of *La méthode de traiter les plaies par arquebuses et autres batons à feu*, by Ambroise Paré, the first treatise on military surgery written in French. Up to this period, a war wound was treated by application of burning oil, in order to clean it, and bleeding from vessels was stopped by contact of a red burned piece of iron. Ambroise Paré replaced the use of burning oil by clear water cleansing, and introduced the revolutionary method of ligature for bleeding trauma vessels.

1552 ■ Creation of the first temporary field hospitals.

1597 ■ Creation of permanent military hospitals, as well as "ambulant" hospitals, which were intended to follow the troops.

1674 ■ Inauguration in Paris by Louis XIV of the Hôtel Des Invalides, a 3,000 bed facility for aging and crippled veterans.

1708 ■ On January 7, a royal edict created a corps of career military physicians.

1766 ■ Edition of the first military hospital publication, *Recueils d'observations de médecine des hopitaux militaires*.

1792 ■ Beginning of 23 years of war between the drafted army of the new Republic, and then the Napoleonic Imperial Army, against the European monarchies. The Val-de-Grâce convent is transformed into a military hospital.

1793 ■ Until then, casualties on battlefields had to wait until the end of battles before being taken care of by surgeons. Larrey and Percy changed that. They obtained from the high command the right to send surgeons to battlefields during the battle. Percy sent surgeons with a minimum of surgical equipment. Larrey introduced the flying ambulances manned by surgeons and their equipment. Early care, rapid evacuation were the consequences of this revolution. The other consequence was triage. Larrey did not introduce the word but the concept of triage in selecting patients who had to be operated on the spot and patients who could wait and be evacuated.

1796 ■ The Val-de-Grâce becomes a teaching institution.

1800 ■ First international agreement to protect the wounded and their physicians, initiated by Percy.

1808 ■ Percy created the first corps of male military nurses, called the *dépostats*.

1810 ■ Napoleon signed a decree making small pox vaccination mandatory for all "Grand Army" recruits.

1812 ■ The battle of Borodino during Napoleon's invasion of Russia, with a total of 80,000 deaths for the two sides, became the highest mass casualty situation for a one-day, one-site battle. Larrey is said to have done more than 200 amputations during this battle. Early amputation was the standard treatment for limb injuries in order to prevent gangrene and death, at the cost of the limb. Larrey was the first to successfully removed a wounded arm by a quick shoulder désarticulation.

1831 ■ During the Algerian campaign, in a field hospital, Baudens performed the first successful surgical repair, using "Lambert stitches", for a penetrating rifle injury of the colon. That was 50 years before aseptic surgery and the development of abdominal surgery. For limb injury he advocated cleansing and a limited removal of dead tissue, reducing the number of routine primary amputations. This modern way of treating that type of wound is now known in French as "parage" (debridement in English). He was also the first to treat hemo and or pneumo thorax by drainage, using urinary catheters. He successfully achieved in a field hospital a hip resection for a massive injury of the upper thigh. For all his contributions to military surgery he was called "the Larrey of the Algerian war". Maillot, a surgeon, prevented the spread of malaria among troops by an extensive use of quinine sulfate discovered 10 years earlier by Pelletier and Cavantou.

1834 ■ Military physicians are recognised as military officers.

1850 ■ Val-de-Grâce becomes the Ecole d'application de la médecine militaire.

1854-1855 ■ During the Crimean War, anaesthesia is used extensively in field hospitals for the first time.

1856 ■ Creation in Strasbourg of the Imperial School of the Military Medical Corps.

1859 ■ Dunant witnesses the carnage of the Battle of Solferino during the war for Italian independence. His book, *Souvenir de Solferino*, leads to the creation of the Red Cross.

1870 - 1871 ■ During the Franco-Prussian War, despite Napoleon's decree on small pox, French troops were not vaccinated and suffered a large number of casualties due to that plague. After its defeat France lost the Alsace-Lorraine province to the Prussians, including the Imperial School for the Military Medical Corps (Ecole Impériale du Service de Santé Militaire) in Strasbourg.

1880 ■ Opening in Bordeaux of the navy military medical school.

1882 ■ The army military medical corps becomes autonomous.

1889 ■ Opening in Lyon of a new school for the medical corps, which replaced the Strasbourg school.

1890 ■ Creation of a civilian colonial medical corps. The navy military medical corps becomes autonomous. Calmette opens a Pasteur Institute in Saigon.

1894 ■ Aléxandre Yersin, from the Colonial corps, discovered the germ responsible for plague, "yersinia pestis".

1896 ■ A medical school opens in Madagascar.

1897 ■ Ernest Duchêne, a medical student from the Lyon military medical school published his "thesis" on *Contribution à l'étude de la concurrence vitale entre micro-organismes, entre moisissures et microbes*. That was 30 years before the first work of Fleming on that topic. That thesis can be seen at the Val-de-Grâce museum;

1900 ■ Official creation of the Medical Corps of the Colonial Troops.

1907 ■ Laveran, professor at Val-de-Grâce, received the Nobel prize for his work on malaria. Opening in Marseilles of the Tropical Institute, called Le Pharo.

1914 / World War I. ■ At the beginning of the war, the policy for abdominal injuries was "no surgery". This rule was the consequence of the bad results of laparotomies during the Boer war. This is only in 1915, when the front line became stable that laparotomies were performed routinely for abdominal war wounds. The results were initially bad, but improved during the conflict.

1916 ■ Birth of the name (if not of the concept) of "triage". During the Battle of Verdun, interventions of the first units devoted to triage, called sections et compagnies de triage. Beginning of blood transfusions for war casualties (ABO groups were identified, but not rhesus group).

1918 / End of World War I ■ During which France lost 1,390,000 people, including 10,000 who were killed while serving in the medical corps. Development of plastic and reconstructive surgery for the thousand of survivors who suffered facial injuries.

1936 ■ French physicians working with international colleagues on the Spanish Republican sides showed the importance of blood transfusions in the treatment of bleeding casualties.

1940 - 1945 / World War II. ■ France lost half a million people. Two million soldiers remained prisoners in Germany. Blood transfusions were then standard in field hospitals. Sulfamides were the only antibiotics available. They did not change much the outcome of war injuries.

1945 - 1954 ■ During the war in Indochina light transportable and parachutable surgical units (antennes parachutistes) were developed and contributed to save a large number of wounded. Primary evacuations by helicopters started also in this campaign. In 1954, following the example of their American colleagues in Korea, French military surgeons treated some arterial injuries by reconstruction and not ligation, .

1947 ■ Creation of an air force medical corps.

1948 ■ The four medical corps (army, navy, air force and colonial corps) serve under a unique surgeon general.

1954 ■ Fall of Dien Bien Phu, which ended the Indochinese War.

1954–1962 ■ During the Algerian War, creation of a corps of réanimateurs trained to provide resuscitation in the field and during evacuation. They were so successful that a similar corps was created in France in 1962 in the civilian community. That was the start of the civilian primary care system called "SAMU".

1968 ■ Completion of the fusion between the four medical corps.

1975 ■ Introduction of the "Service de Santé" external fixator for the treatment of war open fractures. This was the first device of his kind specially devised to treat war open fractures in austere environment. It proved to be very efficient in various conflicts: Chad, Ruanda, Bosnia and many other sites.

1980 ■ Use in Chad of a kit allowing blood auto-transfusion in field hospitals.

1997 ■ Decision to end the draft in 2001; by then all military personnel, including medical corps members, will be active duty.

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Exhibit 1

JEAN FRANÇOIS COSTE'S WORLDWIDE SOCIETY MEMBERSHIPS AND HONORARY DEGREES

- Membre de l'Académie de Stanislas (Société Royale des Sciences et Belles-Lettres de Nancy: Société des Sciences, Lettres et Arts de Nancy), 1774
- Chevalier de la Légion d'Honneur from its foundation
- Officier de la Légion d'Honneur
- Commandeur de la Légion d'Honneur and given Cordon d'Or de Saint-Michel by Louis XVIII in 1814
- Honorary member, Royal Society of Medicine of London; of Edinburgh; of Paris; and of the Royal College of Physicians of Lothringen
- Honorary Fellow, National Academy of Sciences, Arts, and Letters of Sweden; and of Hesse-Homburg
- Member, Royal Academy of Sciences, Arts, and Letters of Leyden; and of Dijon
- Honorary M.D., William and Mary College, 12 June 1782
- Honorary M.D., University of Pennsylvania, 23 December 1782
- Member, Humane Society of Philadelphia
- Fellow, American Philosophical Society, 18 January 1783

Source: Lane JE. Jean-François Coste: Chief Physician of the French Expeditionary Forces in the American Revolution, page 25. Original publishing information no longer available. Manuscript held at Val-de-Grâce Library, 1 Place Alphonse Laveran, 75230 Paris Cedex 05, France.

Exhibit 2

LETTER FROM GEORGE WASHINGTON TO JEAN-FRANÇOIS COSTE

Head Quarters, October 7, 1782.

Sir: Your humane attention to the American Hospitals which were established at Williamsburg after the siege of York has been properly represented to me. I beg you to be assured, Sir, that I entertain a due sense of your kindness upon that occasion, and take this opportunity of testifying how much I think myself and the public obliged to you.

*I am, Sir, your most obt and hble servt
(signed) G. Washington*

Doc' Coste

Physician General

to The Army of H. E. Count de Rochambeau

Reprinted with permission from Lane JE. Jean-François Coste: Chief Physician of the French Expeditionary Forces in the American Revolution, p12. Original publishing information no longer available. Manuscript held at the Musée du Service de Santé des Armées [Museum of the Military Medical Corps], 1 Place Alphonse Laveran, 75230 Paris Cedex 05, France.

Exhibit 3

THE ESTABLISHMENT IN 1796 OF STAGED EVACUATION

The main body of the ambulant hospital, which is henceforth to be called the ambulance, will follow army headquarters, while its main detachments follow the separate divisions or columns, according to strength.

The ambulance divisions designated to follow the different columns of the army will be organized on the footing of provisional hospitals, in the proportion of 60–150 straw pallets, and will comprise, both as to personnel and matériel, everything necessary for the immediate formation of one of two first-aid hospitals, even when under canvas.

Under the name of flying ambulances, the sub-divisions of the ambulance service, which are to be distributed at different points where attack is anticipated, will carry one or two caissons containing six straw pallets and accessories, and appliances for bandaging, such as cases of instruments, bandages, lint, compresses, bread, wine, etc. Flying ambulances will be attached to the advance guard and, during combat, will move to points where fighting is thickest in order to give immediate first aid. Surgeons and attendants will be mounted on lightly saddled horses, while a caisson, drawn by four horses, will carry six blankets, two litters, a box of surgical instruments, and other objects. Distributed over the center and the two wings of the army, these ambulance sub-divisions can replace one another or reunite at need, according to the orders of the commissioner-paymaster in charge of the ambulant hospitals. On the day of battle, the main body of the ambulance should be placed at the rear of the center and as close to the line as is compatible with safety. Directly first aid has been administered, the wounded will be sent to the hospitals of the first and second line.

All these formations are to be provided with sufficient litters to collect the wounded, with vehicles furnished with straw, hoops and canvas tape, to transport them to the base or to the nearest hospital. The men and horses necessary to effect transportation are to be supplied by the contractor for transportation or by the administration and to be reserved exclusively for this service. The personnel of the ambulant hospitals includes a cutler, a copper and tinsmith, a cooper, and baking and laundering personnel, the chests of each being numbered.

Source: Regulation of Floréal, an IV (1796). Quoted by: Sieur; Garrison FH, trans. *Tribulations of the medical corps of the French army from its origin to our time*. The Military Surgeon. 1929;64(July):32–33.

THE FRENCH ORDER OF LEGION OF HONOR (L'ORDRE DE LA LÉGION D'HONNEUR)

Bonaparte, then the First Consul, created the Legion of Honor on Floreal 29, in the year 10 of the revolutionary calendar (19 May 1802). The law, still valid today, states that according to Article 87 of the State Constitution, a Legion of Honor will be created to reward "military services and also civilian virtues." The Legion of Honor followed the Military Order of Saint Louis, created in 1693 by King Louis XIV to honor military services, and took into account only the quality of the services performed and not the recipients' rank or aristocratic birth. The Legion of Honor is presented in the name of the Republic by the president of France. There are five ranks in the Legion Order; from bottom to top, the Legionnaires are called Chevalier, Officier, Commandeur, Grand-Officier, and Grand-Croix.

By the end of the first Empire, the Legion had reached 35,000 members. Until 1914, three fourths of new members were from the military establishment, because of the large number of military campaigns that took place during that period. At the present time, slightly more civilian than military members are selected every year. Women have been officially accepted into the Order since 1851, but until 1914 their number remained very small (0.25%). During World War I, special procedures were established to accelerate the nomination into the Order, and allow people who had died during heroic actions to be nominated. These modifications were reinstated during World War II and the following campaigns. By 1962, the Legion of Honor had reached a maximum membership of more than 300,000. General de Gaulle instituted a reform to reduce the number of members to a maximum of 125,000 by the year 2000. The reform succeeded rapidly, and by 1996 the official number of living members was down to 115,000. Each year, the selection of new members is made according to quotas shared among industry, foreign affairs, culture, academe, justice, state administration, defense, and trade unions.

Among the first new Legionnaires honored by Napoléon was Baron Dominique Larrey, surgeon of the Imperial Guard. Recent civilian medical winners have included Professors C. Cabrol, who performed the first heart transplant in Europe (1969); J. Dausset, who received the Nobel prize for his researches on tissue compatibility; and L. Montagné, who was recognized for his discovery of the human immunodeficiency virus. Captain François Jubin and Lieutenant Pierre Delacroix exemplify military physicians who have been awarded the Legion of Honor for their accomplishments on the battlefield.

MEDECIN-CAPITAINE FRANÇOIS JUBIN

In rare instances, physicians have been honored because of their actions against the enemy. This is the case of Captain François Jubin (1916–1944). Born in Cahors, in the southwestern part of France, he spent his youth in New Caledonia, where his father was a colonial physician. Following his father's steps, he entered into the Bordeaux Naval Military Medical School. In 1940 he was drafted and sent to the front line as a battalion

auxiliary physician. In June 1940, during the German offensive at Boulogne-sur-Mer, he removed his doctor's insignia and joined the fighting troops. He was wounded and taken prisoner into Holland. He escaped and crossed Holland, Belgium, and France from north to south on a bicycle, and in the middle of the summer arrived at family home at Cahors. He then went back to the military medical school, which had been moved from Bordeaux to Montpellier (in the nonoccupied zone) to finish his medical studies. After graduation he officially resigned from the army and got a position as a general practitioner in a little town called Lauzes. He settled there with his pregnant wife and their 2-year-old daughter. During the day he practiced medicine as a local general practitioner, but at night, under the code name *Jupiter*, Jubin was the chief of a resistance network of 130 fighters belonging to the Armée Secrète (secret army). One of his missions was to collect parachuted equipment and arms. The Germans became aware of his activities and started looking for him. In 1943 he managed to escape his encircled village. He immediately sent his wife, daughter, and newborn baby away from Lauzes, and permanently joined the clandestine maquis. During a mission on 28 June 1944 he fell into an ambush organized by the retreating German troops at the entrance of the village of Gourdon. When he was hit, in a car bearing a French flag, he was wearing his uniform, that of a colonial doctor. His body remained in a vineyard for 4 days before it was found. He was 28 years of age.

During a special ceremony in 1949, his older daughter was given his posthumous Legion of Honor medal. His citation reads as follows:

M. François-Marie-Gustave Jubin, Captain of the Free French Forces of the Interior, was an Officer of great bravery and a magnificent leader. After a difficult escape from a prisoner of war camp, he immediately joined the resistance. Nominated chief of a local network in May 1943, he recruited a maquis of 30 cadres and a hundred men. He was killed during a mission, at Gourdon on June 28, 1944 by a unit of the Das Reich elite division fighting the local maquis.

On 26 April 1976 the student class of the Bordeaux Naval Medical School was officially named *Promotion Médecin Capitaine François Jubin* in his honor. (1)

MEDECIN LIEUTENANT PIERRE-MARIE-CHARLES DELACROIX

Most military physicians who got the award on a battlefield were honored because of their courage in caring for the wounded. This is the example of Lieutenant Pierre Delacroix.

Lieutenant Pierre-Marie-Charles Delacroix was born in 1922. In 1948, as a young physician, he was sent into Indochina for his first overseas assignment. He served there as the chief surgeon of a light parachutable surgical structure, an "antenne parachutiste". His courage was officially recognized in 1949 in a first citation issued by the local headquarters of the army. He was then promoted to the rank of captain. On February 18, 1951, because of his courage and his accomplishments for the wounded on the battlefield, he was officially accepted into the Legion of Honor, with the rank of Chevalier.

His citation reads as follows:

Chief surgeon of a parachutable surgical unit supporting paratroopers, he worked intensely during the year 1950. On January 20, despite awful weather conditions, he was parachuted over Sop-Hao, to operate on a seriously wounded commando soldier of the Fifth Colonial Parachutist Battalion.

On February 17, after a long and tiring flight he was dropped over Lang-Vi to take care of 11 wounded of the Second Battalion of the First Parachutist "Hunter" Regiment. Despite enormously difficult dropping conditions, he jumped and immediately after proceeded to operate on eight of them. After that, he walked his way back with the wounded in the middle of a military column which was continuously under enemy attacks, demonstrating his personal courage. On March 1950, he was dropped again with the surgical unit at Pac-Kha. Night and day, in precarious and dangerous surroundings, he operated on 18 wounded from the Third and Fifth Colonial Parachutist Commando Battalions. Since his arrival in "Tonkin" he had a total of 5 jumps and 155 surgical operations in war zones, under enemy fire. (2)

At the same time he also received the Croix de Guerre (War Cross). On 12 July 1969 he was promoted Officier, and then on 7 July 1979, Commandeur of the Legion of Honor. Dr. Delacroix became Professeur Agrégé at Val-de-Grâce Military Medical School and ended his career as chief of the Gynecology Department at Begin Military Hospital near Paris.

1. Montfort R. *Medecin Capitaine Francois Jubin (1919–1944)*. La Cohorte. August 1998;149:21–22.

2. Personal communication from Dr. Delacroix's personal archives.

Exhibit 5

THE VAL DE GRACE MILITARY MEDICAL MUSEUM AND LIBRARY

Museum of the Military Medical Corps

Although the first anatomical collections were established in 1850, an actual museum devoted to military medicine was not officially opened until 1886. In 1918 it was renamed the Museum of Val-de-Grâce and is now named the Museum of the Military Medical Corps (Musée du Service de Santé des Armées, MSSA).

The museum was closed for restoration for several years, and in 1990 a new director, Colonel (Médecin en Chef) Ferrandis, was assigned. Dr. Ferrandis, a military physician, is also a historian and a specialist in museum development (museumology). With the support of various consultants, he totally remodeled the interior of the museum, which is one of the most spectacular parts of the historic Val-de-Grâce convent (Exhibit 5, Figure 1). The new museum is one of the best of its kind, not only because of its content but also for the beauty of its presentation.



(a)



(b)

(a) View of the old Val-de-Grâce convent. Totally restored over 20 years, this portion of the Val-de-Grâce now houses various teaching facilities, the library, and the Musée du service de santé des armées (MSSA), a museum devoted to French military medicine.

(b) A room at the MSSA at Val-de-Grâce, inaugurated in January 1998.

Printed with permission from Musée du Service de Santé des Armées au Val-de-Grâce, Paris, France.

Inaugurated officially in January 1998, the MSSA was opened to the public on 18 March 1998. Coincidentally, the first visitors were a group of American military surgeons who participated in a seminar at the museum that was organized by Norman Rich, MD, Colonel, Medical Corps, US Army (Ret), Chairman, Department of Surgery, F. Edward Hébert School of Medicine, Uniformed Services University of the Health Sciences, Bethesda, Maryland.

Val-de-Grâce Medical Library

The Val-de-Grâce Medical Library is located close to the museum in a magnificent wing of the convent. Its rich collections make it the second largest medical library in France, behind that of the old Paris Medical School. It is a superb, modern, computerized library, where, since 1970, books have been organized according to the classification system of the National Library of Medicine, Bethesda, Maryland.

Source: author



Fig.1 ■ As a war surgeon, Ambroise Paré (1510–1590) developed a new technique of amputation, replacing vessel cauterization with ligatures. In the treatment of wounds, he abandoned the use of burning oil, and advocated cleaning and removal of foreign bodies, including projectiles. In 1545 he published the first treatise in French on war surgery. Oil painting by CE Boulet; 1917. Printed with permission from Musée du Service de Santé des Armées au Val-de-Grâce, Paris, France.



Fig.2 ■ Uniforms of the time: (a) navy physician, 1767; (b) army surgeon, 1775; (c) hospital inspector, 1778. Drawings by Benderly. Printed with permission from Musée du Service de Santé des Armées au Val-de-Grâce, Paris, France.

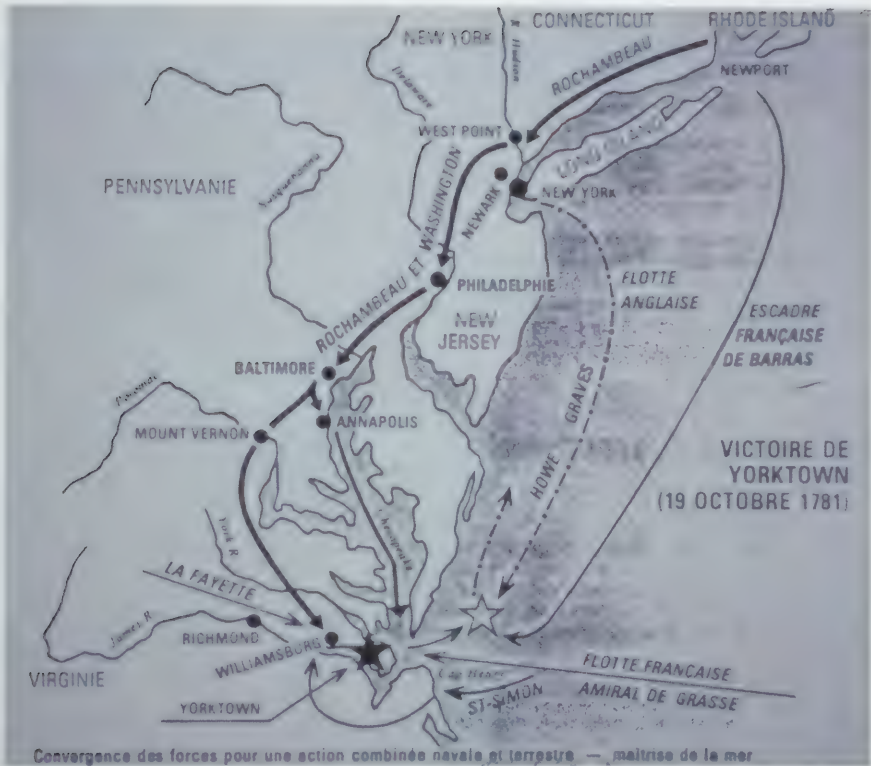


Fig.3 ■ Map of Rochambeau's American campaign, ending with the victory at Yorktown, Virginia (19 October 1781). Drawing by Gillibœuf. Printed with permission from Musée du Service de Santé des Armées au Val-de-Grâce, Paris, France.



Fig.4 ■ Jean François Coste (1741–1819). Chief of the medical corps of Rochambeau's army, he arrived in America during the winter of 1780 and remained until the spring of 1783. Fluent in Latin, he used that language to communicate with his American counterparts. In 1796 he became the first director of the Val-de-Grâce, the Paris Military Hospital, when it became a teaching institution. Between 1805 and 1807, he served as the surgeon general of Napoleon's Grande Armée. Painting. Printed with permission from Musée du Service de Santé des Armées au Val-de-Grâce, Paris, France.



Fig.5 ■ This simplified war pharmaceutical handbook, containing only 79 simple formularies, was written in Latin by Jean François Coste on his arrival in America and published in Newport, Rhode Island, a few months later. The handbook was then distributed to all physicians of the expeditionary corps. Adapted with permission from Comité d'Histoire du Service de Santé. *De l'Antiquité à la Révolution*. Vol 1. In: *Histoire de la Médecine aux Armées*. Paris, France: Charles-Lavauzelle; 1982: 463.

MEDECINE MILITAIRE, INTERNE ET EXTERNE.

On ne peut pas aller de l'autre à l'autre sans passer par le milieu. C'est la seule façon de faire passer les idées et les choses. C'est la seule façon de faire passer les idées et les choses. C'est la seule façon de faire passer les idées et les choses.

Les objets d'enseignement du Collège militaire d'instruction sont, selon les cas, répartis, conformément au règlement, ainsi qu'il suit :

Comme à AMSTERDAM, nous faisons le Circuit en JETTER, tous les jours, à 10 heures, il y a

[illegible][illegible]

Le Club des professionnels du public marin, constitué sous l'égide de l'Association pour l'Amphibien, a des jours et heures qui seront désignés, ainsi que les Comités du Le Club en 1981) pour organiser les usages et règlements.

1. Examen général des flux par la distribution des prix légers qui se sont distingués par leur caractère d'urgence, et leur caractère d'urgence, ainsi que leur caractère d'urgence, dans la dernière partie de l'année.

1. Approuvé par l'Assemblée des Nations Unies. Le Comité des Nations Unies pour le Développement Humain, 1990.



Fig.7 ■ This monument is dedicated to the 600 French soldiers and sailors who lost their lives for the independence of the United States of America during the Battle of Yorktown. The monument is a simple wall that faces the battlefield on one side and the James River on the other. The names of Rochambeau's soldiers who never returned to France can be seen on the southern side of the wall; those of the de Grasse's sailors on the northern side. The monument was inaugurated on 14 October 1989 by Mr. De Margerie, the French Ambassador to the United States.

Fig.6 [page 66] ■ Annual teaching program in military medicine and surgery at the Military Teaching Hospital of Val-de-Grâce in Paris, initiated under Jean-François Coste's deanship, for 1796 (year 4 in the Republican calendar). This announcement describes the academic courses for the first and second semesters, clinical experience in internal medicine and surgery, and the final examination. Printed with permission from Musée du Service de Santé des Armées au Val-de-Grâce, Paris, France.

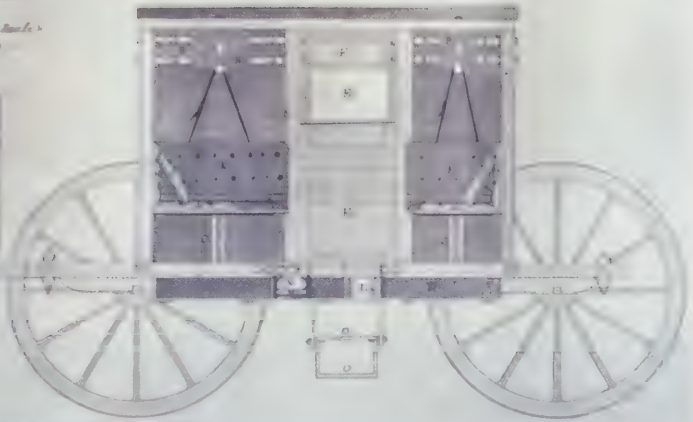


Fig.8 ■ Evacuation of casualties after the Battle at Wattignies with a horse-drawn wagon used as an improvized ambulance. This initial experience led to the development of real ambulances for the transport of wounded. Reproduction of an oil painting by Boulet. Printed with permission from Musée du Service de Santé des Armées au Val-de-Grâce, Paris, France.

Fig.9 [page 69] ■ (a) Project for a field ambulance presented at a competition organized by the revolutionary government in 1793 to define the best model before ordering its construction. **(b)** One of the other projects presented at that same competition in 1793. Printed with permission from Musée du Service de Santé des Armées au Val-de-Grâce, Paris, France.

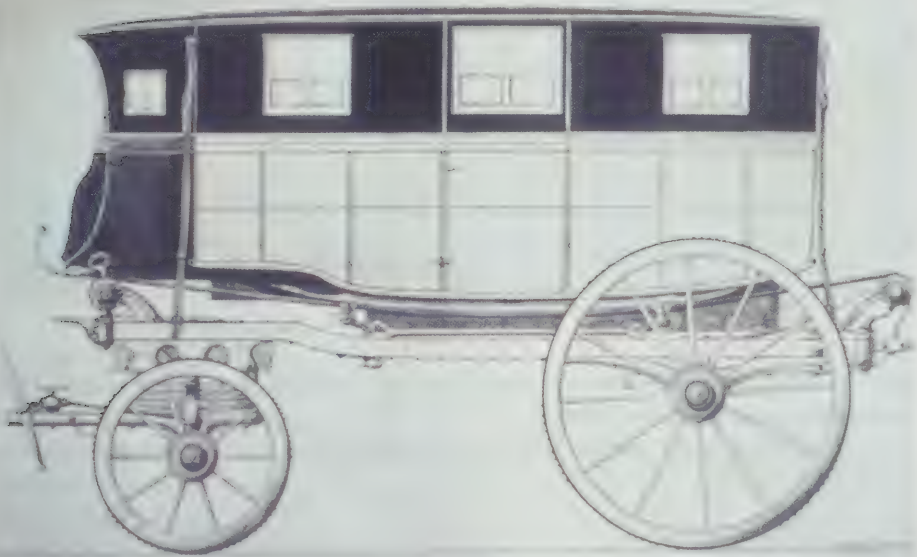
1. *Projet de voiture à bras pour le transport des blessés.*
 2. *Projet de voiture à bras pour le transport des blessés.*
 3. *Projet de voiture à bras pour le transport des blessés.*
 4. *Projet de voiture à bras pour le transport des blessés.*
 5. *Projet de voiture à bras pour le transport des blessés.*
 6. *Projet de voiture à bras pour le transport des blessés.*
 7. *Projet de voiture à bras pour le transport des blessés.*
 8. *Projet de voiture à bras pour le transport des blessés.*
 9. *Projet de voiture à bras pour le transport des blessés.*
 10. *Projet de voiture à bras pour le transport des blessés.*

Projet de voiture à bras pour le transport des blessés



Projet de voiture à bras pour le transport des blessés.
Par M. de la République Française.
1871

(a)



(b)



Fig.10 ■ Uniforms of the time. (a) Surgeon assigned in 1803 to a cavalry regiment (Hussars). (b) Surgeon assigned in 1808 to a cavalry regiment (Chasseurs a cheval). (c) Surgeon assigned in 1808 to the cavalry regiment of the Imperial Guard. Printed with permission from Musée du Service de Santé des Armées au Val-de-Grâce, Paris, France.



(a)



(b)

Fig.11 ■ (a) Portrait of Dominique Larrey (1766–1842), the most famous surgeon of the Napoleonic era. Professor at Val-de-Grâce, surgeon general of the Imperial Guard, and finally surgeon general of the Grande Armée before the fall of Napoleon. Oil painting by Madame Benoist. (b) Larrey's uniform as inspector general, as presented at Val-de-Grâce museum. Printed with permission from Musée du Service de Santé des Armées au Val-de-Grâce, Paris, France.



Fig.12 ■ Larrey's flying ambulance, constructed after his directions. This model was used during Napoleon's campaign into Italy in 1797. There were two models, with two or four wheels. Printed with permission from Musée du Service de Santé des Armées au Val-de-Grâce, Paris, France.

Fig.13 [page 73] ■ The medical corps of a regiment of the Imperial Guard, as organized by Larrey who named it a Decurie (century). Three centuries comprised a legion. *"Made up as it was of elements carefully chosen and with military organization, [Larrey's ambulance legion] was able to render service of the greatest value to [Napoleon's] Imperial Guard, for which it was solely designated."* The medical personnel consisted of the following:

1 surgeon major (commandant) – 2 surgeon aide majors – 12 sub-aids, 2 functioning as pharmacists – 2 lieutenant-stewards – 1 sub-lieutenant, inspector of police and assistant steward – 1 first sergeant and first-class clerk – 2 corporals functioning as third-class clerks – 1 trumpeter and bearer of surgical instruments – 12 mounted male nurses, including 1 master farrier, 1 shoemaker, 1 harness maker – 1 sergeant major as first-class clerk – 2 quartermasters as second-class clerks – 3 corporals as subaltern clerks – 1 drummer to look after matériel.



Transportation for each century was effected by 12 light and 4 heavy vehicles, managed by 20 soldiers of the sanitary train, commanded by a chief sergeant, a sergeant, a subaltern, 2 corporals (1 a farrier), and 1 trumpeter.

Source for the figure legend and the quotation: Sieur; Fielding FH, trans. *Tribulations of the medical corps of the French army from its origin to our time*. The Military Surgeon. 1929;64(Jul):34. Drawing: Courtesy of Xavier Saut, Pau, France.



Fig.14 ■ Triage prior to evacuation via Larrey's flying ambulance (the two-wheel model for two wounded). Oil painting on wood. Printed with permission from Musée du Service de Santé des Armées au Val-de-Grâce, Paris, France.

Fig.15 [page 75] ■ A Larrey Award is given every year in the United States at the F. Edward Hébert School of Medicine, Uniformed Services University of the Health Sciences, Bethesda, Maryland, to a surgeon who has made a valuable contribution to military surgery. When it was created, Norman Rich, MD, Colonel, Medical Corps, US Army (Ret), Chairman, Department of Surgery, wanted to name the award for the most famous military surgeon of the past. He chose Larrey, who is still remembered a century and a half after his death as a surgeon, teacher, innovator, and *"a caring, virtuous man,"* as Napoleon is said to have commented. In 1988, the award was presented to then-Colonel Russ Zajtchuk, Medical Corps, US Army.

USU SURGICAL ASSOCIATES

SUPPORTING
THE DEPARTMENT OF SURGERY, USUHS

1988

BARON DOMINIQUE LARREY
MILITARY SURGEON'S AWARD
FOR EXCELLENCE

PRESENTED TO

Col Rostik Zajtchuk, MC, USA

ROBERT M. WILLIAMS, CHAIRMAN

NORMAN M. RICH, EXECUTIVE DIRECTOR

DAVID C. SABISTON, JR., PRESIDENT

USUHS

BETHESDA, MD

7 APRIL 1989



(a)



(b)

Fig.16 ■ Larrey was famed for his battlefield amputation technique, memorialized in these paintings as performed (a) on Captain Rebsomen on the battlefield, and (b) at the Battle of Borodino; Larrey is shown standing. (a) Oil painting, circa 1823; (b) oil painting copied by Gilbert from a detail of a painting by General Lejeune. Printed with permission from Musée du Service de Santé des Armées au Val-de-Grâce, Paris, France.



Fig. 17 ■ Larrey caring for Maréchal (Marshall) Lannes at the Battle of Essling. Oil painting after Taib. Printed with permission from Musée du Service de Santé des Armées au Val-de-Grâce, Paris, France.



Fig.18 ■ Pierre Francois Percy (1754–1825), chief surgeon for the Grande Armée at two periods: 1800–1805 and 1813–1814. Printed with permission from Musée du Service de Santé des Armées au Val-de-Grâce, Paris, France.



Fig. 19 ■ Percy's "flying surgeons." Percy used artillery equipment (caissons called *Wursts* because they looked like German sausages) to send surgeons rapidly to the battlefield, albeit with a minimum of first-aid materiel. Pulled by six horses, each *wurst* could carry up to six surgeons and six assistants. Oil painting on wood. Printed with permission from Musée du Service de Santé des Armées au Val-de-Grâce, Paris, France.



Fig. 20 ■ Despotats, or male nurses, were developed by Percy and assigned to the medical corps; their function was roughly equivalent to that of contemporary medics. Despotats were medically unfit for combat (eg, the trigger finger was amputated) but were still able to serve, although in a different capacity. The despotats pictured here worked in 2-man teams, each equipped with a lance and a backpack. Each backpack contained half the components of a brancard (stretcher) for casualty evacuation, and each despotat's lance was used as a stretcher pole. Printed with permission from Musée du Service de Santé des Armées au Val-de-Grâce, Paris, France.





Fig.22 ■ Desgenettes (center) and Bonaparte (left, touching the plague victim) in Syria in 1799, with soldiers suffering from plague. Engraving by Hébert after a painting by Bellangé. Printed with permission from Musée du Service de Santé des Armées au Val-de-Grâce, Paris, France.

Fig.21 [page 80] ■ René Nicolas Desgenettes (1762–1837). An efficient hygienist, in 1798 Desgenettes was the chief surgeon of the expeditionary corps sent to Egypt with Bonaparte. In 1807 he became surgeon general of the Grande Armée. Ironically he switched positions with Larrey at Waterloo, and Larrey was then promoted to surgeon general for the Grande Armée. Desgenettes accepted the position of chief surgeon for the Imperial Guard, showing his loyalty to the emperor even in a time of defeat. Oil painting by Horace Vernet. Printed with permission from Musée du Service de Santé des Armées au Val-de-Grâce, Paris, France.



(a)



(b)

Fig.23 ■ Uniforms of the time: (a) assistant military physician (1833), and (b) surgeon of the Imperial Guard (Second Empire), with the rank of general (1867). Printed with permission from Musée du Service de Santé des Armées au Val-de-Grâce, Paris, France.



Fig.24 ■ Field surgeon during the conquest of Algeria (1832). Engraving by V. Adam; 1832. Printed with permission from Musée du Service de Santé des Armées au Val-de-Grâce, Paris, France.





Fig.26 ■ Principal Surgeon Scrive, center, caring for wounded at the Battle of Inkerman (5 November 1854) during the Crimean War. Oil painting by Rizo. Printed with permission from Musée du Service de Santé des Armées au Val-de-Grâce, Paris, France.

Fig.25 [page 84] ■ Mass casualties at Sebastopol, Crimea, in 1855. Photograph. Printed with permission from Musée du Service de Santé des Armées au Val-de-Grâce, Paris, France.



(a)



(b)



Fig.28 ■ Chloroform mask developed by A. M. Reynaud, a navy surgeon, and used extensively during the Crimean War. Lithograph by A. Gué. Printed with permission from Musée du Service de Santé des Armées au Val-de-Grâce, Paris, France.

Fig.27 [page 86] ■ (a) Convoy of wounded soldiers during the Franco–Prussian War (1870–1871) under the protection of the newly created Red Cross. **(b)** Women serving as auxiliary Red Cross agents taking care of casualties during the Franco–Prussian War. Engravings by Lançon. Printed with permission from Musée du Service de Santé des Armées au Val-de-Grâce, Paris, France.



Fig.29 ■ Lucien Jean-Baptiste Baudens (1804–1857) was called “*the new Larrey*” in the 1830s and 1840s during the French conquest of Algeria. He made history when he achieved the first successful repair of a gunshot injury of the colon in 1831. A talented researcher and surgeon, he wrote and published an impressive amount of material on war surgery, including the report of his two surgical repairs of colon wounds. Printed with permission from Musée du Service de Santé des Armées au Val-de-Grâce, Paris, France.



Retour des survivants du combat de Beni-Mered
Le sergent Trassias en litière.
Le muletier sous aide Decuor en cacolet.

Fig.30 ■ Primary evacuation during the Algerian War of Conquest (1830–1847). Baudens invented this stretcher, called a cacolet, for evacuation over rough terrain. Photograph of an engraving. Printed with permission from Musée du Service de Santé des Armées au Val-de-Grâce, Paris, France.

CLINIQUE DES PLAIES D'ARMES A FEU,

PAR
M. L. BAUDENS, D.-M.-P.,

OFFICIER DE LA LÉGION D'HONNEUR, EX-CHIRURGIEN EN CHEF DES
AMBULANCES DE MEDEAH, MASCARA, ET TLEMCEN, EX-CHIRURGIEN EN
CHEF DE L'HÔPITAL CARATINE A ALGER, CHIRURGIEN MAJOR, PROFESSEUR
D'ANATOMIE ET DE CHIRURGIE OPERATOIRE A L'HOPITAL MILITAIRE
D'INSTRUCTION D'ALGER, MEMBRE CORRESPONDANT DES ACADEMIES DE
MÉDECINE DE MARSEILLE, LYON, MONTPELLIER, ETC.

PARIS,

J.-B. BAILLIÈRE,

LIBRAIRE DE L'ACADÉMIE ROYALE DE MÉDECINE,
Rue de l'Ecole de Médecine, 13 bis.

A LONDRES, MÊME MAISON, 219, REGENT STREET.

1836.

(b)

I^{re} OBSERVATION.

Coup de feu à travers l'abdomen. — Examen du trajet parcouru par la
balle. — Incision pour donner issue à une portion d'intestin grêle
longue de huit pouces et perçure dans deux endroits. — Extraction
de toute cette anse intestinale. — Suture d'après le procédé de
M. Lembert. — Muri le troisième jour. — L'autopsie fait voir une
trouée perforation qui avait échappé à nos recherches.

Un soldat du 13^e régiment de ligne, blessé,
dans l'Atlas, d'un coup de feu qui, entré un peu
à droite de la région ombilicale, avant sa sortie
en arrière dans le point occupé par le muscle
carré lombaire, fut porté à l'ambulance peu
d'instants après sa blessure.

336 RECHERCHES PAR ARMES A FEU

II^e OBSERVATION.

Coup de feu à travers l'abdomen. — Incision de cette partie pour faciliter
la sortie d'une anse intestinale volumineuse. — Suture. — Guérison.

Un soldat appartenant au bataillon des vo-
lontaires parisiens, blessé, en 1831, sous les
murs de la ferme-modèle, par une balle qui, en-
trée trois pouces en dehors de l'ombilic du côté
gauche, était sortie dans le dos en dehors de la
colonne vertébrale, fut plus heureux que le sol-
dat du 13^e régiment dont nous venons de parler.

L'introduction du doigt à travers la plaie
n'ayant fait distinguer d'abord que portion d'in-
testin durcie par la contraction de sa couche
musculaire, ne permit de découvrir bientôt
après la solution de continuité dont elle était af-
fectée; et en retirant le doigt, comme il était im-
prégné de matières mercurielles, il me fut aisé de

(c)

Fig.31 ■ (a) Cover of the book entitled *Cliniques des plaies d'armes à feu*, in which Baudens reported his experience in Algeria. The book was published in Paris in 1836. **(b)** Page 333 of Baudens' book contains his summary of the first case of colon injury on which Baudens did a surgical repair in 1831. The patient died a few days later. At autopsy Baudens found a perfect suture but discovered a second colon wound that had been missed during the operation. **(c)** Page 336 of Baudens' book contains a summary of the second case of colon injury on which Baudens did a surgical repair, also in 1831. This patient did well and recovered quickly. This is the first successful surgical repair of a rifle wound of the colon in a battlefield hospital.



Fig.32 ■ Vaccination session at Val-de-Grâce Hospital in 1911. A calf with cowpox (vaccinia) is tied to a table and directly provides the viral material for Jenner's method of vaccination against smallpox. Oil painting. Printed with permission from Musée du Service de Santé des Armées au Val-de-Grâce, Paris, France.



Fig.33 ■ The Vinh-Long hospital ship, used at the turn of the century during colonial overseas operations. The diagram is of the layout of the medical facility: I. Consultation room; II. Pharmacy; III. Linen storage closet; IV. Morgue; V. Infirmary; VI. Hydrotherapy room; VII. Nurses' quarters; VIII. Hospital. Printed with permission from Musée du Service de Santé des Armées au Val-de-Grâce, Paris, France.

Fig.34 [page 93] ■ French colonial medical schools. (a) The first class of the medical school of Tananarive, Madagascar, with their director, Médecin Principal Jourdan (center, in white trousers). The school was created in 1896; the first class graduated in 1902. (b) The Hanoi Medical School opened in 1902; the bacteriologist Alexandre Yersin was its first director (see also Fig.38). Photographs. Printed with permission from Comité d'Histoire du Service de Santé. *De la Révolution française au conflit mondial de 1914. Vol 2. In: Histoire de la Médecine aux Armées.* Paris, France: Charles-Lavauzelle; 1984: 371 (view a), 376 (view b).



(a)



(b)



Fig.35 ■ Edmond Delorme (center) practicing a pleural decortication at Val-de-Grâce Hospital in 1892. He described in 1902 a surgical technique for the treatment of prolapsed rectum, which bears his name and is still performed today. Oil painting by Margueritte Delorme, daughter of Edmond Delorme. Printed with permission from Musée du Service de Santé des Armées au Val-de-Grâce, Paris, France.

Fig.36 [page 95] ■ Charles Louis Alphonse Laveran (1845–1922). Professor at Val-de-Grâce, he became the first French recipient of the Nobel prize for medicine in 1907 for his discovery of the etiology of malaria. He used half of the prize money for the foundation of a laboratory for tropical diseases at the Pasteur Institute of Lille. Photograph. Printed with permission from Musée du Service de Santé des Armées au Val-de-Grâce, Paris, France.





Fig.37 ■ Jean Antoine Villemin (1827–1892), professor at Val-de-Grâce. In 1865 he showed that tuberculosis was a disease experimentally transmissible by inoculation from animal to animal. It was 17 years before the German bacteriologist Robert Koch identified the responsible germ, and another 20 years before Calmette, another member of the Colonial Medical Corps, and Guérin created the bacille bilié de Calmette-Guérin (BCG) vaccine against tuberculosis. Printed with permission from Musée du Service de Santé des Armées au Val-de-Grâce, Paris, France.



(a)



(b)

Fig.38 ■ (a) Alexandre Yersin (1863–1943) was a member of the Colonial Medical Corps. He discovered the bacillus responsible for plague, which now bears his name (*Yersinia*), then worked on a serum to fight it (Yersin's serum). (b) The modest laboratory where Yersin identified the microorganism responsible for plague in Hong Kong. He also founded the Nha Trang Pasteur Institute, Nha Trang, Vietnam. (See also Fig.34.) Photographs. Printed with permission from Musée du Service de Santé des Armées au Val-de-Grâce, Paris, France.



Fig.39 ■ Uniform of the time: a captain of the medical corps in 1915. Printed with permission from Musée du Service de Santé des Armées au Val-de-Grâce, Paris, France.



Fig.40 ■ (a) The Hospital Pozille, a tent hospital run by the French National Red Cross in 1915. **(b)** The Tortoise tent, which was especially designed for the medical corps in 1910, was used in World War I. Photograph (a) and model (b). Printed with permission from Musée du Service de Santé des Armées au Val-de-Grâce, Paris, France.



Fig.41 ■ Primary evacuation from World War I trenches in Verdun. Drawing. Printed with permission from Musée du Service de Santé des Armées au Val-de-Grâce, Paris, France.

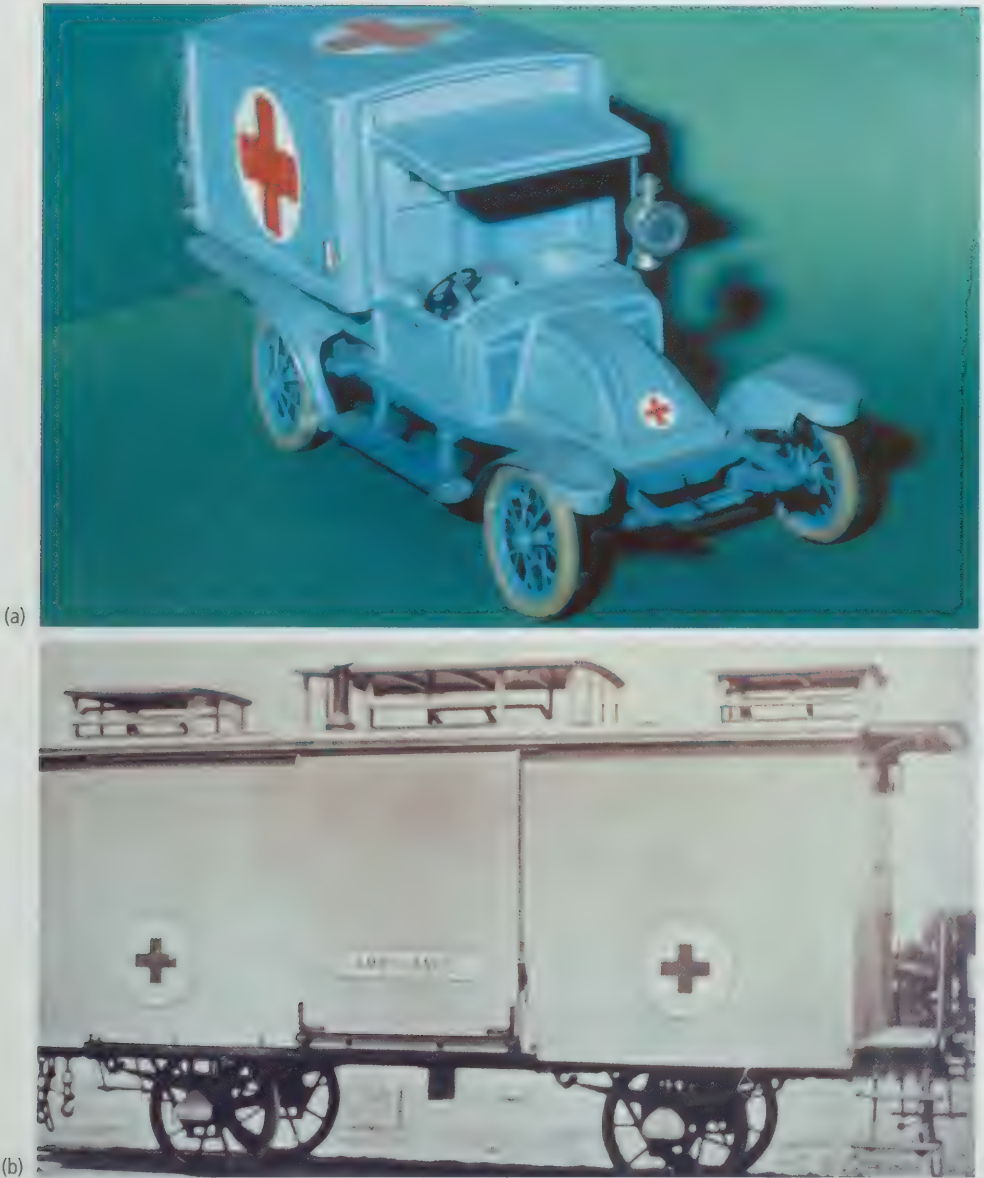


Fig.42 ■ (a) Sanitary automobile (motor ambulance) designed in 1910. Only a few were available in 1914. (b) Sanitary train. Several were in service at the beginning of the war. During the first few weeks they were used to evacuate all casualties directly to the hospitals of the rear. Without prior triage, the wounded were sent as far away as Paris or other towns of the interior. The results were disastrous. Model (a) and photograph (b). Printed with permission from Musée du Service de Santé des Armées au Val-de-Grâce, Paris, France.

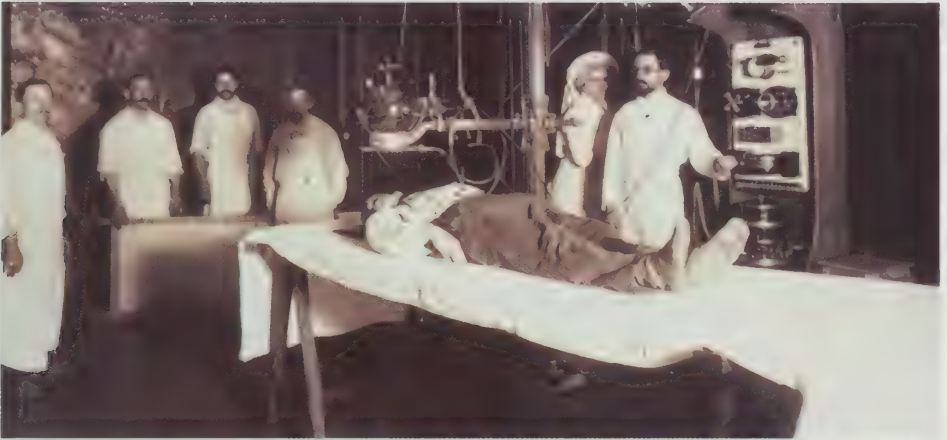


Fig.43 ■ Mass casualty situation: a convoy of wounded arriving at the east entrance of the la Chapelle railway station in Paris, France, in 1914. Oil painting by P. Prévot. Printed with permission from Musée du Service de Santé des Armées au Val-de-Grâce, Paris, France.

Fig.44 [pages 102 - 103] ■ Logistical advances for equipment necessary to perform military surgery during World War I. (a) Mobile radiology apparatus connected with a field surgical unit. (b) Radiology room in a field hospital. (c) Vaillard and Besson field mobile sterilization system. (d) Operating room in a field hospital. Photographs. Printed with permission from Musée du Service de Santé des Armées au Val-de-Grâce, Paris, France.



(a)



(b)



(c)



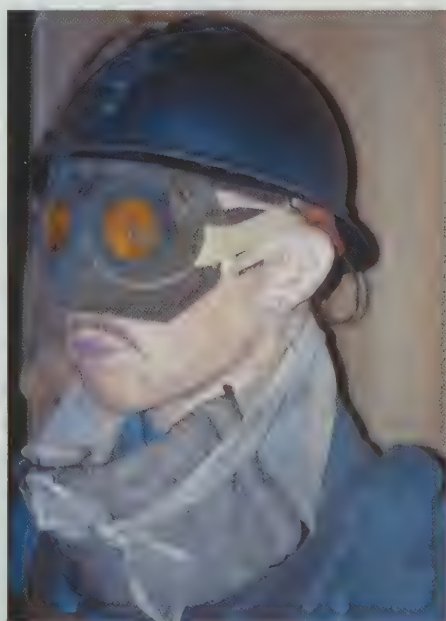
(d)



Fig.45 ■ Victims of the first gas attacks. Chlorine affects the eyes like tear gas. Gas Alert, oil painting on wood by Fargeot. Printed with permission from Musée du Service de Santé des Armées au Val-de-Grâce, Paris, France.



(a)



(b)



(c)



(d)



(e)

Fig.46 [pages 104 - 105] ■ Evolution of gas masks during the months following the first German gas attack at Ypres, Belgium, on 22 April 1915. (a), (b), and (c) Ad hoc masks developed before the M2. (d) and (e) Two views of the fabric M2 mask, which was developed late in 1915. The waterproof cover surrounds the celluloid goggles. The wearer inhaled and exhaled through numerous layers of muslin impregnated with alkalis (thiosulfate, sodium ricinoleate, sodium sulfanilate, sodium phenate) and, later, hexamine. The M2 could be donned quickly, had a large surface area, and did not constrain respiration. But it was not gas tight, and unless it was frequently reimpregnated and kept dry, its gas-neutralizing capability quickly deteriorated. Source for figure legend: Vinet. *La Guerre des gaz*, pp 1390, 1395. Cited by: Haber LF. *The Poisonous Cloud: Chemical Warfare in the First World War*. Oxford, England: Clarendon Press; 1986: 72–73. Photographs. Printed with permission from Musée du Service de Santé des Armées au Val-de-Grâce, Paris, France.



Fig.47 ■ Formal dress uniforms in 1935, from left to right: a colonel (pharmacist), a general (physician), and a captain (physician). Printed with permission from Musée du Service de Santé des Armées au Val-de-Grâce, Paris, France.



Fig.48 ■ (a) Uniforms in 1943 of the Free French (with General de Gaulle): left, a female and a male doctor, each with the rank of captain; right, a male nurse. **(b)** Uniform in 1944: a physician with the rank of captain. Printed with permission from Musée du Service de Santé des Armées au Val-de-Grâce, Paris, France.





Fig.50 ■ Helicopters were first used for casualty evacuation in the Indochinese War. The pilot of the Helicopter Hilaire in this photograph is Captain Valérie André (third from left), an air force doctor who became famous for developing this kind of evacuation. Later she became the first woman to reach the rank of general in the French armed forces.

Fig.49 [page 108] ■ Primary evacuation in 1953 during the Indochinese War of Independence (1945–1954). Photograph. Printed with permission from Musée du Service de Santé des Armées au Val-de-Grâce, Paris, France.





Fig.52 ■ Evacuation during the Algerian War of Independence (1954–1962). Photograph. Printed with permission from Musée du Service de Santé des Armées au Val-de-Grâce, Paris, France.

Fig.51 [page 110] ■ Commandant (Major) Grauwin, left, the best-known French surgeon at Dien Bien Phu, in the operating room during the days preceding the fall of Dien Bien Phu in 1954. Photograph. Printed with permission from Musée du Service de Santé des Armées au Val-de-Grâce, Paris, France.



(a)



(b)



Fig.54 ■ The Val-de-Grâce complex in Paris: left, the beautiful church built by Anne of Austria, the wife of King Louis XIII; center, the cloister, which contains the teaching facilities, library, and museum; and at the back of the garden, the new, X-shaped, 400-bed Val-de-Grâce hospital.

Fig.53 [page 112] ■ (a) The new Lyon Military Medical Academy, École du Service de Santé des Armées, which opened in August 1981. **(b)** Monument at the entrance of the new Lyon school with its Latin motto, *Pro patria et humanitate*.



Fig.55 ■ View of the new “Hôpital Percy”, which opened in 1996. At the entrance, the bust of Baron Percy. This hospital contains the only military trauma center in the Paris area. It is also famous for its internationally known “Burn Center”.



How was the French Military Medical Corps born and when, what was its evolution, who were the most important personalities of the Corps, where does it stand today after the end of the draft? In this book, the author, a military surgeon, gives the answers to these questions for the first time in English. I am very grateful to Pr. Rignault for bringing this new contribution, to the history of our medical corps.

Mr. Le Médecin Général des Armées Michel Meyran,
Surgeon General of the French Medical Corps.



SERVICE DE SANTÉ DES ARMÉES

